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93FE0051D Beijing JISUANJI SHIJIE [CHINA COMPUTERWORLD] in Chinese 9 Sep 92 p 1

[Article by Zhang Qi [1728 3825], Applications Office, Computer Department, Ministry of Machine Building and Electronics: "Colleagues in the Computer Industry From Both Sides of the Strait Parlay on Development Plans. Coalescence of the Full Strength of the Chinese People in Pursuit of the Economic Interests of Chinese"]

[Text] On 24 and 25 August 1992, the *1992 Workshop on Scientific and Technical Cooperation and Exchange Between Industries on Both Sides of the Strait*, which was organized jointly by the Taiwan Economic Research Institute and the Mainland Straits Economic, Scientific, and Technical Cooperation Consulting Company, convened. This marked yet another distinguished gathering of the light yellow descendants for mutual exchanges as part of the frequent contacts during recent years. A delegation numbering more than 100 people from Taiwan science and technology industries and academia led by Mr. Liu T'ai-ying [0491 3141 5391], director of the Taiwan Economics Institute, visited Beijing where more than 200 people from industry on both sides of the strait took part in this meeting. Sun Jian [1345 0256], a State Council councillor as well as director of the State Science and Technology Commission; State Science and Technology Vice Minister Zhu Lilan [2612 7787 5695]; National Defense Science, Technology, and Industry Commission Chairman Ding Henggao [0002 5899 7559], and Vice Chairman Huai Guomo [2037 0948 2875]; Sun Xiaoyu [1327 2556 6735], Deputy Director of the State Council's Taiwan Office, and leaders concerned from the Foreign Economic Relations and Trade Office attended the meeting. The Ministry of Machinery and Electronics, the Ministry of Aeronautics and Astronautics, the Nuclear Industry Corporation, the Ministry of Posts and Telecommunications, and the State Pharmaceutical Administration chaired special team meetings including the astronautics team, the nuclear industry team, the machine building team, the computer team, the laser team, the communications team, and the biotechnology and pharmaceuticals team. The 2 days meetings were intense and enthusiastic. Chinese from both sides of the strait happily gathered under one roof to discuss together a grand design for the promotion of cooperative exchanges on industrial science and technology between both sides of the strait, and for linking hands to face the world science and technology industrial stage. Here, a brief presentation will be provided only on the meetings of the computer team.

1. Improved Cooperation Between Computer (and Information) Professionals on Both Sides of the Strait Is the Trend of the Times and the Desire of the People

After 2 days of candid and friendly exchanges, colleagues in the computer (and information) fields on both sides of the straits unanimously agreed that the 1990's will be a crucial historical period in the vigorous development of the Chinese race. Dramatic changes in the international situation, the development of regional economies, and intensification of international economic competition in recent years have made the economy of East Asia more vigorous than ever. Its potential is very great. Both sides fully realize the importance of the computer information industry to the development of the national economy and the people's standard of living. Forecasts call for the information industry to become the number one industry in the world by 2000 with an output value of $900 billion. With the rapid development of reform and opening up to the outside world on the mainland, and the steadily intensifying contacts between both sides of the strait, economic and trade cooperation that has as its beginning cooperation in industrial science and technology is in process of formation. During the intense upheaval and restructuring of the international computer business, the light yellow descendants on both sides of the strait are jointly exploring points for cooperation and, under the principle of mutual benefit, they are striving to link hands, offset each others weaknesses with their own strengths, and use the total strength of the Chinese people in a battle for a dominant position in the world. Without doubt, this will enable the Chinese to occupy an extremely important position on the world economic stage, and it is also the common desire of Chinese on both sides of the strait.

2. Analysis of the Basic Position of Computer Professions on Both Sides of the Strait

The computer team composed of 19 people from the Taiwan Acer Corporation headed by Chairman of the Board Stan Shih [Shih Chen-jung [2457 2182 2837], and 12 people from the mainland Ministry of Machine Building and Electronics' Computer Department headed by department director Yang Tianxing [2799 1131 5887], totaled 31 in all. The two conveners provided briefings on the development history and current situation in the computer industry on both sides of the strait, supplying information about pertinent industrial policies that further deepened mutual understanding. Taiwan's computer industry has boomed during the past 10 years becoming sixth in the world in terms of hardware output value. This includes numerous products such as personal computers, monitors, terminals, mice, and mainframes in which it holds a leading position in the world market. In order to accelerate the escalation of the industry, Taiwan quarters concerned have enunciated a course for the development of new industries for the next 10 years, and have selected key projects for development. This includes 10 major industries including the computer (information) industry, the communications industry, the semi- conductor industry, and the consumer electronics industry. Great development of these industries is predicted over the next 10 years. Generally speaking, the output value of Taiwan's information industry will increase at an average 17 percent per year during the period 1990-1996.

After 30 years of arduous efforts, the mainland computer industry has now begun to take shape. A complete industry including research and development, manufacturing, application, software, and information processing are in process of formation, and manufacturing capacity is increasing year by year. Advances in software have been very rapid during the past several years, and the application of computers has permeated every trade and industry, providing powerful

support for the high speed development of the national economy. Achievements have been particularly outstanding in the fields of Chinese text information processing, artificial intelligence, and specialized systems.

Analysis by both sides concluded that the mainland computer industry possesses substantial strength in research and technology, and that its basic research base is good; it has a complete research system and ample human talent; market potential is large; and it has potential for low cost development. However, the scale of its industrial production is inadequate; commercialization capabilities are weak, and it lacks both international marketing channels and experience. However, Taiwan produces hardware on a large scale; it has accumulated rich experience in production, marketing, and management during the past 40 years; it has wide open channels to international markets, plentiful funds, and its systems application and commercialization capabilities are strong. Were it to be combined with the scientific and technical, human talent, and other resources of the mainland, the strengths of both sides of the strait would complement each other. By linking hands in cooperation to form a totality that concentrates the total strength of the Chinese people, its strength would be even greater, and it would have prospects for several major accomplishments. A quest for the economic interests of all Chinese, raising the international position of the entire race, and being an equal match for the computer industry throughout the world is a goal toward which the information industry on both sides of the strait might jointly struggle.

3. Key Areas of Cooperation

Given the cooperative thrust that many contacts between both sides of the strait provides, as well as the individual strengths and attributes of each side, full cooperation is planned at many levels including research and development, production and manufacturing, product sales, and protection of intellectual property rights. This meeting emphasized attainment of a consensus on the following topics:

On Protection of Intellectual Property Rights:

1. Development of high technology products is inextricably linked to intellectual property rights. Formulation of intellectual property rights protection measures acceptable to both sides of the strait is of crucial importance. Both sides expressed a desire to take additional effective actions to improve intellectual property rights protection. They recommended formation of a joint work team to conduct publicity, promotion, and coordination for the purpose of improving the understanding of both parties of the law and administrative procedures, and to assist the other party's firms in the legal and commercial handling of rights violation cases by industries on both side of the strait.

2. Basic Technical Research and Establishment of Information Technology Standards

Both parties have fine experiences in cooperating to draw up Chinese text information standards IS/10646. In the future, they will cooperate on the standardization of standards for the UNIX and DOS operating systems, on drawing up character symbol regulations, on unifying specialized computer terminology, and on drafting EDI standards. Both sides agreed to the establishment of Chinese text processing work teams on both sides of the strait for the purpose of moving ahead with the drawing up of the concerned standards and to serve as coordination centers and points of contact with international organizations. The work teams will make arrangements to establish a Chinese text information fund and to raise funds on both sides of the strait to provide financial and material support for the work mentioned above.

In addition, both sides highly regard the important position of EDI in its spread and application to information systems. Both parties decided to hold EDI workshops on both sides of the strait in the near future. In Taiwan, the workshop is to be run by an added value network association, and on the mainland, the Computer Department of the Ministry of Machine Building and Electronics is to organize it.

3. Planned Projects for Technical Cooperation

In numerous technical fields, the mainland has plentiful research accomplishments and meets international standards. Full use can be made of these accomplishments and Taiwan's access to international markets to find opportunities for cooperation between both sides of the strait that are complementary and mutually advantageous. Efforts can be made in the following regards:

- Propagate China's culture through the development of technical products for distinctively Chinese fields of application such as Chinese-foreign language translation machines, CAI, a Chinese medicine expert system, an agriculture expert system, a diagnosis expert system, and multimedia software on Chinese culture, history, and technology.
- New technology and new products such as multimedia technology, high performance application and open computer systems, and high definition television.
- Further commercialization of large amounts of existing research achievements, priority given to the selection of fairly mature technologies that can be readily commercialized for earliest possible translation into productivity.

The number of projects on which both sides can cooperate are extremely large. It is suggested that further exchanges take place soon, such exchanges to be organized by the Taiwan Information Policy Association and the Mainland Ministry of Machine Building and Technology's Computer Department for the middle of September in Beijing, invitations being extended to academicians and entrepreneurs. This meeting should select projects in the aforementioned fields for extensive discussion, specific units being selected to conduct substantive cooperation on them.

4. Cooperative development of a large national level information system:

In the financing of electronics projects, the main emphasis in the mainland is on the building of 10 large information and professional management systems. Taiwan also has a 5-year plan for the information industry for the purpose of

creating a large information system structure. Thus the possibility exists for both parties' widespread cooperative use of system compatibility and large scale computer yingbi [2019 3024] systems engineering.

Since user needs are the main consideration in large information systems, different specialized questions coming up in different fields, separate study must be done to help increase the understanding of both parties and to attain a specialized division of labor. Both parties must agree to hold workshops on large information systems on both sides of the strait, cooperatively conducting discussions of separate topics in specialized teams.

Specific units have been selected to implement the foregoing provisions.

5. For the establishment of a research and development center and exchanges of skilled personnel:

The mainland recommends the selection of Beijing and Pudong in Shanghai as key sites to help Taiwan set up research and development and demonstration centers.

On the exchange of skilled personnel, both parties feel that mutual surveys and visits of scientific and technical personnel are crucial to increasing understanding and promoting cooperation. Therefore, Taiwan agrees to do all possible to invite scientific and technical personnel from the mainland to take part in international technical and academic workshops or across-the-strait technical and academic workshops held in Taiwan, as well as to facilitate their travel to Taiwan for exchanges. The mainland will also request the Ministry of Machine Building and Electronics and other units to help with application procedures.

By way of promoting exchanges, Taiwan intends to establish a joint office on the mainland, which the mainland welcomes. Specific particulars are to be worked out by both sides.

To summarize the foregoing, this exchange and discussion by people concerned with computers on both sides of the strait fully expresses the spirit of both sides of the strait linking hands in cooperation and for joint development under the principle of mutual benefit, linking science and technology to industry. It permits exchanges and cooperation across the strait to rise to a new stage—entering the stage of substantive cooperation on industrial matters. Both the mainland and Taiwan have their own strengths that are remarkably complementary. Across-the-strait cooperation is extremely beneficial for further development of both the industry and the science and technology of both. This bilateral, high level exchange and discussion occurred against a background of the development of regional economies internationally, Taiwan's facing an upgrading of its industry, and the mainland's further implementation of Comrade Deng Xiaoping's remarks during his visit to south China for further reform and opening up to the outside world in every direction and multiple ways. This provides the best opportunities for cooperation and development for the light yellow descendants on both sides of the strait. Let us fight together to put the Chinese people in an unassailable position in world economic competition during the 21st Century, for the vigorous development of the Chinese race, and for the great cause of the unity of the motherland.

Across-the-Taiwan-Strait Meeting on Industrial S&T Exchange

93FE0005C Beijing JINGJI RIBAO [ECONOMIC DAILY] in Chinese 2 Sep 92 p 4

[Article by Correspondent Zhang Ju [1728 5112]: "New Realm For Economic, Scientific, and Technical Cooperation Across the Taiwan Strait. Hold Hands and Orient Toward the World"]

[Text] During August, nearly 200 people from the scientific and technical world and the industrial world gathered in Beijing to take part in the "1992 Across-the-Strait Workshop on Industrial Scientific and Technical Cooperation and Exchange." They discussed and conducted exchanges on the development and future of industrial science and technology in the fields of spaceflight, outer space, nuclear industry, machinery, photoelectronics, and biopharmacy.

Just as each side of the Strait has developed in a distinctive way, each having its own strengths, so too a separate relationship exists in the numerous fields of science and technology that provides a fine basis for scientific and technical cooperation and exchange between both sides of the Strait. Simultaneous with impetus in recent years toward steady development of across-the-strait relations has been a ground-breaking development of economic, trade, scientific, and technical exchanges. In addition, the international situation is also undergoing important changes, regional economic blocs gradually taking shape. Therefore, how both sides of the strait can use the standpoint and global outlook of the Chinese people in active development of a new realm of across-the-strait economic, scientific, and technical cooperation is a matter of common concern to both, as well as one that is in urgent need of solution.

China Science and Technology Association deputy director Zhang Cunhao [1728 1317 3185], and Mr. Liu T'ai-ying [0491 3141 5391], director of the Taiwan Economic Research Institute, who led the delegation visiting Beijing, gave speeches at the workshop. They said that the convening of this meeting is the fruition of efforts during the past several years by people in the scientific and technical world and in the industrial world on both sides of the strait, and it is also a new starting point for cooperation and exchanges across the strait. Only such cooperation can accelerate a rise in the level of industry, science, and technology on both sides of the strait.

Following discussions, delegates to the meeting unanimously agreed on the need to do work in the following three regards:

1. The need for active development of mutual survey visits by scientific and technical personnel in all fields for the purpose of regular exchanges of scientific and technical data and scientific and technical publications. Study of the establishment of an across-the-strait information system on scientific and technical patents and other matters, thereby improving mutual understanding of people in industrial science and technology on both sides of the strait.

2. In view of the differences in scientific and technology terminology on both sides of the strait, means of unifying them need to be discussed; attention should be given to the protection of intellectual property rights and to standardization and unification; and the establishment of cooperation and exchange norms should be studied. Such work will permit the basic building of scientific and technical cooperation and exchanges.

3. Selection of projects for cooperation in the industrial science and technology realm that are of interest to both parties to produce results. Special emphasis should be given to exchanges on academic parks to promote the development of cooperation on science and technology industries across the strait.

Both sides recommended the establishment of a permanent organization to promote across-the-strait cooperation and exchanges on industrial science and technology once conditions are deemed to exist.

The rank and file of workshop participants hoped that people in science and technology and in industry on both sides of the strait will conduct mutual exchanges in broader fields, orient toward the world hand in hand, open up enduring cooperation, and gradually move from unity in the industrial and scientific and technical realm to the unity of all China.

During their stay in Beijing, the Taiwan delegation also visit he main rocket assembly plant, the main satellite asse bly plant, the nuclear industry corporation, the No 1 Machine Tools Plant, the Taiji Corporation, and Zhongruan Corporation.

Caohejing High-Tech Zone, Wales' Newtech Park Sign Cooperation Agreement

93FE0051E Beijing ZHONGGUO DIANZI BAO [CHINA ELECTRONICS NEWS] in Chinese 4 Sep 92 p 3

[Article by Correspondent Mao Xifang [0379 6932 5364]: "Shanghai Caohejing High-Tech Zone and British Newtech Science Park in Wales Sign First Cooperation Agreement"]

[Text] On 14 August, the Shanghai Caohejing New Technology Development Zone Development Corporation and the Newtech Science Park and Innovation Center in Wales signed a letter of intent to cooperate. This is the first cooperative contract signed between a Chinese new technology development zone and a foreign science park.

The Newtech Science Park and Innovation Center is one of the science park and management organizations in the United Kingdom having the greatest innovation potential. The intent to cooperate that both sides reached includes the following:

Establishment between the two science parks of a cooperative relationship for the exchange of information and experiences;

With support from the Chinese State Science and Technology Commission, the Shanghai Municipal Science and Technology Commission, the British Cultural Commission, and other organizations, the Caohejing Development Zone is to arrange for mutual visits of personnel, to organize academic exchanges, and to engage in commercial cooperation. It is also to use its cooperative relationship with Newtech Park in Wales to explore new mechanisms for promoting various forms of cooperation between the park in Wales and the zone in China, including technology transfers, market sales, and product manufacture and sales.

In addition to exchanging experiences and information with the Caohejing Development Zone, Newtech Park will work together with its relevant organizations in the UK and Europe to assist in the development of medium and small size enterprises in the Caohejing New Technology Development Zone. This is to include the training of managerial and administrative personnel and technology transfers, and help with industrial design and assuring international quality.

Nie Rongzhen on Developing China's Own S&T

93FE0005B Beijing GUANGMING RIBAO in Chinese 28 Jul 92 pp 1-2

[Article by Nie Rongzhen [5119 2837 5271]: "Hold to the Road of Developing Distinctively Chinese Science and Technology"]

[Text] Editor's Note: In November 1991, Marshal Nie Rongzhen wrote the forward to *Modern China's Defense Science and Technology Endeavors*, which affirms achievements in national defense science and technology, summarizes the basic experiences of nearly 40 years of development, and pins great hopes on the countless people working in national defense science and technology. This newspaper's publication of this article on the eve of the 65th anniversary of the founding of the PLA is by way of cherishing the memory.

Modern China's National Defense Science and Technology Endeavors has been published. This is an extraordinarily significant event on the Chinese science and technology front that deserves congratulation.

National defense science and technology is an important integral part of China's socialist modernization, and it is also a new field of knowledge. The people who have committed themselves to this endeavor and who have battled for a long time are unsung heroes. This book presents rich and detailed historical data about the process whereby China's national defense science and technology developed from nothing to become strong. It expresses the dauntless spirit of the countless workers in national defense science and technology who yearn to build China, ardently pursue ideological values in their endeavors and who do not fear hardships, dangers, and difficulties in bravely scaling the scientific and technical heights.

Following a CPC Central Committee and State Council decision, I was in charge of and managed work of this kind for a period of time when I was a headmaster. Publication of this book takes me back to that daunting era of struggle to innovate, and those tumultuous and eventful years, and I feel extremely gratified and also that some problems deserving our exploration and consideration still remain.

Many times in recent history China has suffered aggression and bullying at the hands of imperialists. Mastery of modern science and technology to build a strong national defense is the urgent desire of the Chinese people and many noble-minded patriots. However, such a long-cherished wish can only be realized in the new socialist China. For the past 30-odd years, under the leadership of the CPC and the people's government China's national defense science and technology—like work on all other fronts—has seen unprecedented development and has made world-arresting achievements. Using their own intelligence and energy, the hard-working and courageous Chinese people have founded a fairly complete national defense science and technology system on the old extremely backward Chinese economy and technology. They have trained up a high quality national defense science and technology corps, completed ground-breaking and sophisticated historical tasks, produced an effective nuclear- self-defense capability, developed new conventional weaponry, and have made striking advances in spaceflight and other high technology fields to enter the front rank in the world, thereby greatly increasing national stature and military prowess for a heightening of the country's international prestige and standing. This is a vivid expression of the superiority of socialism.

The concentration in a single spot of the main experiences gained in making the foregoing achievements in new China's national defense science and technology proceeded from China's national circumstances and realities in taking a road of development of independence, taking charge ourselves, and self-reliance.

(1) Maintenance of centralized and unified leadership, handling the correlation between the building of the economy and the building of national defense, and the relationship of the modernization of science and technology to the modernization of industry, agriculture and national defense in terms of an overall national and national defense development strategy provide fundamental support for the sustained, stable, and coordinated development of national defense science and technology. Following the founding of the new China, the CPC Central Committee, the State Council, the Central Military Commission, and the old generation of proletarian revolutionaries like Mao Zedong and Zhou Enlai, devoted extremely great attention to the important position and role of science and technology in the development of the socialist economy and the building of a modern national defense. In addition, as the international strategic situation changed, as the building of national defense necessitated and the national economy permitted, at various historical periods they drew up a series of effective plans and policies for the country's national science and technology, proposed realistic struggle objectives, and drafted development plans. Subsequently, under the centralized and unified leadership of the Party and the state, they took vigorous actions to build scientific research and experimentation organs, to organize a science and technology corps, and to mobilize forces everywhere in the country and energetically coordinate them for joint efforts on key problems. As a result, China quickly broke new ground and mastered sophisticated international technologies including the atom bomb, the hydrogen bomb, missiles, and artificial satellites. This also lay the material and technical foundation for subsequent development. Practice has shown that along with the leadership in building the economy that it provided, the CPC Central Committee's plans and decisions for giving attention to building national defense, making the development of national defense science and technology a principal strategic task in national defense modernization, concentrating the needed manpower, material, and financial resources for key construction and the development of national defense science and technology were entirely correct.

More major achievements were scored through the policies of reform and opening to the outside world and linking military and civilian efforts on the national defense science and technology front during the new historical period. They also contributed to the building of the national economy. Thanks to the correct policy of concurrent concern for economic construction and the building of national defense that the CPC Central Committee—in which Comrade Jiang Zemin is the nucleus—espoused, China's national defense science and technology will make new advances as national economic strength continues to increase.

(2) Adherence largely to self-reliance in striving to improve our own research and development capabilities is a basic policy in the development of national defense science and technology. China is a large socialist country that has completely transformed its backward appearance, increased the scientific and technical level of all nationalities, and realized four modernizations. It cannot depend on others; it can depend only on the intelligence, wisdom, and arduous struggle of the Chinese people themselves. When China began to develop national defense science and technology, the CPC Central Committee proposed a policy of self-reliance for the most part and obtaining foreign assistance as a complement. It is because of our adherence to the implementation of this correct policy that the development of our national defense science and technology is not beholden to anyone, has been able to withstand constant international changes, and has been able to break blockades and sabotage from every quarter to take an independent and self-assertive course of development. To persevere in self-reliance does not mean closing the country to international intercourse. We must take any assistance we can get, study and apply world advanced scientific and technical achievements, and learn lessons from and employ successful experiences that suit China's circumstances. In the past, we actively sought foreign assistance; today we must make even fuller use of the favorable conditions that reform and opening to the outside world provide to conduct broad international technical exchanges and cooperation on the basis of equality and mutual benefit, selectively import advanced technology and scientific research equipment, elevate the starting point from which we conduct our own research and development, and speed up development to serve self-reliant development of national defense science and technology. However, we must maintain a sober view of foreign assistance and imports; we cannot harbor unrealistic illusions. History has shown backwardness puts one in a passive and vulnerable position; reliance on others makes one beholden to them; and money cannot buy modernization for our country. In

the final analysis, we must rely on our own efforts to build our country and realize the four modernization.

(3) Adherence to reform and opening to the outside world, combining military and civilian efforts are inevitable trends in the development of science technology industries in peacetime, and it is also the right way to improve self-development capabilities and increase overall returns. During the early period of building and developing its national defense science and technology industries, China paid attention to and advocated linking the efforts of the armed forces and civilians. It required war industries to learn the two skills—making full use of existing capabilities and planning the production of civilian goods while ensuring fulfillment of orders for military stores. Thus it was able to spread promptly results achieved in national defense science and technology to the building of the national economy. Following the Third Plenary Session of the 11th Party Central Committee, in responding to the new situation of national economic and national science and technology reform, national defense science and technology industries implemented a strategic policy of economic construction as the key link for a readjustment of the product mix, scientific research, and production capabilities. It devoted most of its energies to building the national economy, using the existing highly trained corps as a starting point for increasing investment, increasing technological transformation, and maintaining and building a suitable size, structurally rational, modern, national defense science and technology force to serve as a main force that was primarily responsible for national science and technology tasks requiring stringent efforts. At the same time, in accordance with the principle of vigorous coordination, it was necessary to link this main force with scientific and technical forces in all fields throughout the country, and to make a cooperative division of labor for joint completion of important project research and development tasks. The state also made planned used of the strength and potential that national science and technology industries had to focus on the development of high technology civilian projects and products for the gradual building of a new military and civilian national defense science and technology system.

(4) Maintenance of close attention to the building of both spiritual and material civilization, combining theory and practice to nurture and train up a national defense science and technology corps possessed of a superb ideology and work style that is able to do battle is an important foundation for success in national defense science and technology. China's national defense science and technology corps possesses lofty ideology and a revolutionary spirit of ardent love for the motherland, ardent love of socialism, ardent love of the CPC, self-reliance, arduous struggle, innovation and realism, unity and cooperation, and selfless contribution. Not only has it produced a golden age, creating the material and technical foundation for the modernization of national defense, but it has also brought into being a generation of truly great persons imbued with the fruits of spiritual civilization. This is a product of the national defense science and technology front's support for the leadership of the party, support for ideological and political work, support for implementation of the Party's policies regarding intellectuals, support for Marxism-Leninism and Mao Zedong Thought, and taking materialist dialectics as a guide in doing national defense scientific and technical research. We greatly value efforts to continue this glorious tradition, and to carry it forward under new historical conditions. Science and technology are the main factors driving the development of productivity. Scientific and technical workers are trail blazers for the new productivity. Full play of their zeal, initiative, and creativeness is a major prerequisite for the development of productivity. We must inculcate a new ethic of respect for science, respect for knowledge, and respect for skilled people throughout society, nurturing a new generation of outstanding young scientific and technical talent for the flourishing of the country's national defense science and technology that makes the older generation of scientific and technical experts radiate technological vigor.

(5) Maintenance of respect for objective laws to enhance scientific management is an important requirement for hastening the development of national defense science and technology. In the process of building and developing national defense science and technology, China has proceeded from its own national circumstances and the character of its own national defense science and technology to fashion a leadership and management system that is under centralized and unified leadership of the CPC Central Committee, the State Council and the Central Military Commission, that links together research, production, and application, and that prepares plans that take all factors into account. Since the development of national defense science and technology must obey objective laws, a specific form of organization and management of large scale national defense scientific and technical research work has been established. This has played a fine role in improving scientific management, overcoming decentralization and duplication, increasing overall returns from investment in science and technology, concentrating forces, completing several important matters, and hastening the development of national defense science and technology. Under the new circumstances, national defense science and technology has once again responded to the macroenvironment of reform and opening up to the outside world, has learned lessons from foreign experiences, and is in the process of carrying out reforms and explorations in various regards from which it has gained some new experience. At the same time, it is also realized that reform of the national defense science and technology system must proceed from China's socialist economic foundation, both responding to the needs of the planned commodity economy, doing things according to economic laws, and taking into account the special nature of national defense science and technology. It must use social benefit, meaning the national security interest, as a standard to promote a greater contribution to the modernization of national defense, guarding against a tendency to pursue economic returns alone. Practice in reform should be used to bind the two together well for the building and perfection of a national defense science and technology management system and methods that are distinctively Chinese, and standardize it, make it more scientific, and more responsive to the law.

At the present time, a scientific revolution marked by high and new technology has developed by leaps and bounds throughout the world, and it has increasingly become an important factor in judging a country's overall strength and military prowess. Increasingly people appreciate that science and technology mean productivity. The coming decade is of crucial importance in the vigorous development of China. The country's scientific and technical workers are taking on a heavy historical responsibility to bring about the second strategic goal and a new scientific and technical revolution in building the national economy and developing society. As an old soldier on the science and technology front, I expect, and I believe that comrades on the front line of national defense science and technology, who possess a glorious tradition, will certainly be able to use their own strengths and guiding role to create new achievements that are worthy of the great motherland and worthy of the Chinese people in building China's socialist four modernizations.

Major Change in S&T System, Benefits for S&T Personnel

93FE0005F Beijing RENMIN RIBAO OVERSEAS EDITION in Chinese 7 Sep 92 p 1

[Article by Correspondent Sun Xiaoning [1313 2556 1337]: Major Reform of China's Science and Technology System. Accelerates Apportionment of Talent; Rationalizes the Structure. Consistent Support for Basic Research and Apportionment of Forces to the Main Battleground of the Economy"]

[Text] Beijing, 5 September—China's science and technology system is facing a profound change. As part of this change, more than 5,000 scientific research institutions, more than 1,000 institutions of higher education, and large numbers of scientific and technical business concerns will speed up the apportionment of human talent, rationally readjust the structure, and further transform their operating mechanism for better solution to the problem of interfacing science and technology with the economy.

In a 7 September briefing of the correspondent, officials concerned at the State Science and Technology Commission and the State Commission for Restructuring of the Economic System said that, as of now, China's science and technology system is conducting a revamping of the scientific and technical talent apportionment and organizational system. This measure aims at "steadying one end while freeing one portion." This means steadying support for basic research and basic technical work while removing strictures on technology development institutions, institutions that benefit the public, and institutions providing scientific and technical services. At the same time, it will induce and give impetus to the apportionment of a substantial portion of the strength of scientific and technical institutions and institutions of higher education apportionment to the main battleground of economic construction, to operating scientific and technical business concerns, to developing high and new technology industries, and to developing newly emerging tertiary industries related to scientific and technical progress. Unremitting efforts over a period of 3 to 5 years will be made for substantial completion of the revamping of the structure of the science and technology system.

According to *Thoughts on the Apportionment of Talent, Revamping of the Structure, and Further Intensification of Science and Technology System Reform," reform of China's science and technology system includes the following measures: Continuing use of the Natural Science Fund to support scientists in the selection of basic research projects, use of "Ascension" plans to support major basic research projects, and use of moving ahead with high technology research plans to gain the high ground in contemporary science and technology to ensure steady development of basic research. However, the traditional planning system must be reformed and a competition mechanism introduced. Revamping institutions that benefit the public and scientific and technical services institutions will be done as necessary, most of them being converted from the institutional type to the business type, except for institutions engaged in basic technical work for society, which will continue to receive state support. Business style management will be instituted, and a self- development mechanism set up that possesses vigor and vitality.*

The pattern of having both mostly public ownership as well as ownerships by diverse economic components must be maintained in developing scientific and technical enterprises, policies framed for further easing the climate for development of civilian-operated scientific and technical institutions. Assurance must be given that policies to ensure support for and promotion of the development of civilian-operated scientific and technical enterprises will remain unchanged for a long time.

All departments and units concerned must courageously reform the scientific and technical personnel assignment system that has been hamstrung for a long time. Scientific and technical personal working on basic research, high technology research, the building of important projects, and tackling key projects will have their wages raised substantially, some of them reaching the highest international and domestic levels. Their wages and benefits must gradually be made comparable with those in foreign countries. The wages and benefits of scientific and technical personnel engaged in technology development, scientific and technical service research, and research for the public benefit must be further decontrolled. The state must permit all jurisdictions and all industries to draw up and try out, in accordance with the law, policies that confer high honors and substantial rewards to those who make outstanding contributions.

Major Research Projects Slated For the Rest of the Century

93FE0005H Beijing RENMIN RIBAO OVERSEAS EDITION in Chinese 7 Sep 92 p 1

[Article: "Briefing on National Ascension Plan Projects"]

[Text]

Basic Research on High Temperature Electric Superconductivity

The rapid development of applied research on high temperature conduction stems from solution to some basic problems. Research on high temperature superconduction oxides

is an academic field that is rich in content and holds great promise for physics, chemistry, and materials science as well as for the science and development of technology. Understanding of the superconduction mechanism of copper oxide compounds already goes beyond the scope of electrical conductivity itself to become a leading-edge topic of research on strongly connected electronic systems in condensed state physics. From the angle of structural chemistry, it is also a major component of research on compound valence problems. Principal aspects of basic and applied research on the mechanism and materials for high temperature superconductivity are as follows: (1) Analysis of new materials. (2) Research on the structure and chemical properties of super conduction materials. (3) Research on superconduction micromechanisms. (4) Physical research on the preparation of thin films, technology and components. (5) Research on magnetic flux lattice dynamics and magnetic flux pinning.

Large Scale Science and Engineering Calculation Methods and Theories

A part of this project consists of research on large scale science and engineering computation methods and theories, the emphasis being on computation methods and theories. Main areas for research include the following: Power system computation methods and theories, particularly new geometric calculations about the new Hamilton system and its application to celestial mechanisms; methods of calculating non-linear partial differential formulas and the basic theory underlying them; fluid dynamics calculation methods and theories; finite element methods, and calculation methods and theories for complex structure and compound materials; calculation methods for quantum chemistry and structural chemistry as well as calculation methods and theories for linear and non-linear algebraic formulas and optimization problems. This is leading edge and overlapping basic and applied basic research that cuts across different scientific fields of broad applicability.

Exploration of Semiconductor Super Crystal Lattice Physics and Materials and Devices

The main objects of this project are the low dimension semiconductors (two dimension, one dimension and zero dimension) possessing various kinds of artificial sheared energy band structures, research being mostly on their new points of difference with the common three dimensional solid state ones, new effectiveness and potential applications; and study and analysis of new principles and new structure of super crystal lattice quantum devices, as well as physical processes pertaining to the devices. It is expected that with steady inputs of manpower, materials, and money over a fairly long period of time, planning will emphasize high level research topics that are highly innovative in inspiration as well as new and original in physical conception. With a firm grasp on the mainstream orientation of international development, and active use of the work conditions that can be attained in China, we will be able to seek opportunities and breakthrough points to contend for leading edge scientific research achievements. We must rationally dispose our forces to do research and development work on new materials and new devices that is strongly basic and exploratory in nature and that has limited objectives. As a result of efforts during the Eighth 5-Year Plan, this project can play a role in stimulating and promoting the development of China's semiconductor science and technology, and can produce important results at the advanced international level on various important topics.

Non-linear Science

Five topics divided into two categories have been decided on as "non-linear science" projects. In the first category is research on the problems common to all non-linear systems that are already well-known. In the other category is various special non-linear systems such as turbulence in plasma and fluid dynamics and specific problems in the life sciences. The goal in researching these "specific traits" is to gain a better understanding of "general traits." The nine topics in the first category are as follows: (1) mathematics theories for integrable systems, (2) soliton tests and physical characteristics, (3) thorough study of dissipation system chaos, (4) chaotic behavior in conservative system, (5) quantum chaos, (6) experimental research in chaos, (7) fractal mathematical theory, (8) the physical mechanism of fractals, and (9) infinite-dimension systems for formulaic description of non-linear development. The six topics in category 2 are as follows: (10) basic mechanism underlying time- space discrete systems, (11) the role of stochastic forces on non-linear systems, (12) research on dynamics paths of turbulence, (13) various non-linear phenomena in live systems, (14) study of the interrelationship of various structures, chaos, and turbulence in plasma, and (15) non-linear dynamics of evolution of damage to solid state material.

Machine Verification and Its Application

This project is in a field of science in which the science of mathematics overlaps with computing science. It applies to both the natural sciences and the technical sciences. Its theoretical research can have a far-reaching effect on the revival of mathematics in China and the renewal of all mathematical science. If mental labor is to be mechanized, the mechanization of mathematical science has to come first. Research on its mechanization will lead to research on the mechanization of many sciences enabling computers to replace to a greater degree the mental labor of mankind that can be replaced, thereby propelling the development of social production to a higher plane.

The pioneering work in machine authentication that Chinese scientist Wu Wenjun [0702 2429 0193] has done since the 1970's has attracted widespread attention both in China and abroad. International mathematicians and computer scientists universally refer to Wu principles and Wu methods. China holds a leading position internationally in key areas of the mechanization of mathematics.

Nano Materials Science

Nano data science is an important integral part of nanometric science. It is a totally overlapping science, and a century-spanning strategic scientific and technical field. Nano materials include the two basic levels of nanometric particles and nanometric solids. When physical, chemical, or biological methods are used on a large piece of nano

material to pulverize it into nano particles, their character is markedly different from the large piece of material. For example, after dazzling metals such as brilliant gold and bright silver are pulverized nano particles, they both appear black, becoming sunspots that absorb visible light almost completely. This new and different characteristic permits research and development of novel photothermal and photoelectric conversion materials, infra-red detectors, and microwave and light wave absorbing materials for use on stealth aircraft and battleships. High density solids made from nano particles are called nanometric solids that exhibit characteristics different from conventional metals and ceramics. For example, nanometric ceramics show a certain toughness and ultra-plasticity. Calcium fluoride ceramics can be twisted 100 percent at room temperature. The nanometric scale is a new field between atoms and molecules and macro-materials that is not yet completely understood. Its research and development holds important strategic significance for science and technology.

Important Leading Edge Topics in Theoretical Physics for the 1990's

New breakthroughs on the leading edge of theoretical physics are in the offing for the 1990's. Examples include new phenomena and new laws in the ultra-high energy field of particle physics, and the testing, examination, and development of standard models; leading edge problems in the quantum field and related mathematics and physics; and closely linked multiple electronic systems and high temperature superconduction mechanisms etc. Breakthroughs in these fields will produce a major impact on the development of science and technology. A high degree of attention must be given these matters strategically for the long-range development of science and technology. In addition, at growth points in some overlapping sciences, such as the overlapping between biophysics and theoretical physics, and the overlapping between artificial structural materials and theoretical physics, new and important leading edge topics in theoretical physics may take shape within the near future. These must be given ample attention too.

Multi-Wave Band Tracking and Research on Intense Astral Activity

Recent discoveries in astronomy show that in the course of their evolution, all celestial bodies go through a stage of intense activity that plays a crucial role in their evolution. Quasi-stellar objects and active galactic nuclei, bursting galaxies, super novas, accretions and jet streams, X-ray bursts, gamma ray bursts, and such intense celestial activities have become the most active leading edge fields of astrophysics to which ample attention must also be given.

Research on Major Chemistry Problems in the Life Process

Proteins, nucleic acid, and sugars are the three kinds of biological macromolecules affecting the nature of life's activities. They are the most important material basis sustaining the normal operation of the living mechanism. This project concentrates outstanding people in the chemistry field who are interested in research on the life sciences, and it binds more closely together various disciplines. It sets up three special topics that involve research on major chemistry problems in the life process, namely, research on sugar chemistry (the first special topic), and all new proteins and the design and synthesis of functional fields (the second special topic), and the chemistry of functional systems such as biological catalysts (the third topic). This should provide a deeper understanding of the make-up of biological macromolecules, the relationship between structure and function, as well as their functioning mechanism in organisms.

Research on Functional System Molecular Engineering

Molecular engineering can provide impetus for weeding through the old to bring forth the new in chemistry, and may give impetus to the development of chemistry. This project intends to use research and development work on various functional systems to spur the building of pertinent parts of molecular engineering, and to provide a new starting point for further research and development work. At the present time, two major systems are to be selected for research, namely high specific purpose multi-cell systems and structured molecular systems. These two kinds of systems have a bearing on functional systems including adsorbents, catalysts, solid electrolytes, photoelectric materials, various kinds of sensors, and multi-layer membranes.

Polymer Condensed State

Research on the polymer condensed state is for the purpose of understanding how molecular chains are built up during the polymer condensation process, the polymer glass state, crystal state, liquid crystal state, highly elastic state, fluid state, and orientation state; to understand at the molecular level from the point of view of interrelated role of chains how outside forces play a role in the changing, giving way, and destruction of materials, and their various physical characteristics as a means of building a solid theoretical foundation for the use of polymer materials and designing and building molecules.

The Excitation State of Atoms and Molecules, and the Dynamics of State to State Reactions

Research on state-to-state reaction dynamics and on atom and molecule excitation state structure and dynamics can shed light on the nature of the chemical reaction and physical process. This can play a role in spurring the development of numerous branches and sub-branches of related sciences. At the same time, it can clarify the catalyst mechanism, improve chemical industry production, improve energy utilization efficiency, prevent atmospheric pollution and protect the ozone layer, be applied to laser isotope separation, create new kinds of special materials, improve semiconductor production technology, discover new types of lasers and understand atomic frequency standards used in spaceflight, and perform other important functions.

Basic Research on Rare Earth Science

The substance and goal of research in this project is to interrelate four fields: to make major breakthroughs within 5 years on dynamic state and multiple outlet cascade extraction theory; to make major breakthroughs in research

on fourth generation rare earth permanent magnetic materials that perform better than neodymium, iron, and boron to reach the leading international level, thereby enabling the spread of rare earth magnets in the electrical machinery industry for greater machinery portability and energy conservation. Make important advances in research on new rare earth compounds possessing special photo, electrical, and magnetic characteristics; synthesize a series of new rare earth functionally compatible things, metallic organic compounds, and atomic clusters, explore the mechanism by which rare earths increase crop yields, the application of rare earths to the fields of catalysts, medicine, and the life sciences, scoring achievements that have an important impact internationally; and summarize lanthanide series theory, the laws of spectroscopy, and design new rare earth molecules and new materials.

Basic Research on the Use of Male Sterile Hybrid Heteroses in Grain, Cotton, and Oil-bearing Crops

This project makes use of the country's plentiful crop resources in thorough research on the physiological, biochemical, and genetic basis for hybrid heteroses, mostly in paddy rice, wheat, barley, oats, cotton, and oil-bearing crops, the male sterile mechanism, and ways and means of creating new sterile lines. Insofar as possible, it also seeks to unearth new germ plasma resources to serve as a theoretical guide for male sterility and hybrid heteroses in grain, cotton, and oil-bearing crops, and to score major breakthroughs in practice. It is expected that between 5 and 10 years will be required before basic research on male sterile and hybrid heteroses will score major breakthroughs in China and reach the international level in some regards.

Research on the Optimum Nitrogen Fixation Node Control Model for Symbiotic Nitrogen Fixation Systems

This project consists of seven topics centering around the three centers of node formation, nitrogen fixation, and chemical simulation, and using node formation and chemical simulation as the emphasis. The overall goals during the Eighth 5-Year Plan are as follows: (1) to clarify the molecular mechanism having to do with the regulation and control of the node formation gene to come up with a node formation gene regulation and control model; (2) to clarify the physiological mechanism that initiates, regulates, and controls the symbiotic nitrogen fixation gene in order to come up with integration of the nitrogen fixation system with the ammonia assimilation system, and a dissociation and overall regulation circuit; (3) to clarify the biological significance of the M_x structural element with regard to make-up, structure, spectroscopy, and quantification; study of molybdenum, iron, and sulfur (oxygen) cluster compounds/azotase active center analogs, and the relationship between analysis molecule structure and the nitrogen fixation function; and verification and development of "active component assembly" design to provide reliable theoretical data for chemical simulation of biological nitrogen fixation.

Research on the Main and Collateral Channels For Vital Energy Flows Along Which Acupuncture Points Are Located

This project will make a thorough study of the following topics: (1) Further exploration of the mechanism in the formation of main and collateral channels for energy flow such as sensory points along the channel, and the attendant material basis for it. (2) Thorough study of the pattern of correlation between the collateral channels for energy flow and the internal organs, and the ways in which they are connected. (3) Further understanding of the pathways through which vital energy circulates and methods for testing chemical attributes; and further explanation of the functional significance and material basis for certain biochemical attributes in the layout of the channels; setting up micro-area image identification technology, organically linking molecular events to structural changes in the affected parts for a deeper understanding of various attributes of the channels. (4) Application of modern scientific concepts such as "chaos and category dimensions" for theoretical research on "non- equilibrium state self-organization structural theory" for the energy flow channels.

Research on New Peptide Chains and Protein Folding

Professor Zou Chengdu [6760 2110 7627] said that the refolding of denatured protein could not serve as a model for refolding of new peptide chains. He also said that in the biological synthesis process, new peptide chains both synthesize and fold, and their configuration steadily readjust as well. Very naturally, this produces a series of problems as follows: Do secret space-time structural codes exist? What are these codes? How do they play a role? What factors influence the folding process? If some new peptide chains go through a membrane for delivery to a designated site and also have to go through a stretching out and refolding process, how are changes in the space-time structure regulated? The answer to these questions will permit a theoretical answer and practical guidance to the question of why peptide chains generated through gene engineering methods cannot curl into designated structures and active proteins.

Research on the Molecular Biology of Malignant Tumor and Cardiovascular Pathogeny

We must both find the general laws governing the pathogenesis of malignant tumors and cardiovascular disease, and explain the special laws applying to genetic changes that occur in the pathogenetic process of different kinds of tumors and cardiovascular disease. We will study genetic treatment ways and means to provide a theoretical basis for the treatment of malignant tumors and cardiovascular disease. Our molecular biology research on the pathogenesis of malignant tumors and cardiovascular disease is not only extremely necessary but also entirely possible. The country already possesses certain requirements and a foundation for making a major breakthrough over the next 10 years.

Research on the Physiological Basis For High Yields and High Resistance of Main Farm Crops

This project is for the purpose of conducting physiological research using the existing high, medium, and low yields of the country's main farm crops to establish a theoretical

system whereby inputs of minimum resources yield a maximum increase in yields, and to propose a high yield, high resistance crop production system, and regulation and control principles suited to China.

Brain Functions and Their Cellular and Molecular Foundation

This project will study the following: (1) The brain's sensory functions, concentrating on the sense of sight and the sense of pain. (2) Study of memory and its cellular and molecular basis. (3) Cellular and molecular mechanisms for some nervous system functions.

This research will permit systems work in the above fields that is highly competitive internationally, and will permit China's entry into the front ranks of the world in various aspects of work on cells and molecules, which is presently relatively weak.

Research on the Structure, Performance, Molecular Design and Preparation Process for Photoelectric Materials

This project's research will further improve the theoretical research system for molecular engineering, crystal engineering, and microstructure engineering. Research will be done on new kinds of ultraviolet, infrared, and electro-optic crystal materials, new type semiconductor laser frequency multiplication materials and organic light refracting materials, the user of lasers in micron super lattices systematically studied—particularly the laws governing propagation and success of wave guidance structures. Research is also to be done on various related materials and devices as well as on light refraction effects in order to lay a solid foundation for steady production of new types of "Chinese brand" photoelectric materials.

Research on Femtosecond Laser Technology and Ultra-Fast Processes

This project's purpose is the development of femtosecond laser technology to provide diagnostic technology and equipment at the advanced international level for physics, chemistry, biology, information and matrerials sciences, and to provide diagnostic technology and equipment at the advanced international level for research having a bearing on new sources of energy such as laser fusion breeding. In addition, research will be conducted on several ultra-fast processes. This project can stimulate research in many scientific fields. It is an international leading edge topic that will have a widespread and profound effect on the development of China's science and technology, economy, and society.

Research on Various Major Problems in the Cognition Science

Cognition science is a new science that cuts across many scientific fields including many kinds of cognitive and intellectual activities such as psychology, neurology, computer science, information science, and linguistics, as well as other basic sciences (such as mathematics and theoretical physics). It is the study of the nature of human intellect and cognition and the science of their regularities. Its research scope includes awareness, attention, memory, movement, language, reasoning, reflection, and even consciousness.

This project includes research in two regards: (1) the relationship between computing and intelligence, and (2) theoretical and applied basic research on artificial nerve networks.

The problems in the two foregoing regards are basic problems in cognition science. A breakthrough on any problem will make a major contribution to understanding the basic nature and laws of human intelligence and cognition.

Nano Structure and Devices Physics and Mesoscopic Physics

The purpose of this project is to use research on the design and manufacture of nano structures as a basis for thorough researching of current carrier delivery in semiconductor devices, and the basic laws governing the quantum effect in nano structures, mostly semiconductor materials. This is to lay a foundation for research on a new generation of electronic devices based on the quantum effect and for the development of large scale ULSI and UMSI technology.

Basic Research on Processes For Burning Coal and Petroleum For High Efficiency and Low Pollution

Coal and petroleum are the main objects of this research project, the main task to be tackled being to obtain high efficiency and low pollution from them. Basic research in the following nine regards is contemplated: Air movement and gas-solid, gas-liquid movement in combustion chambers; heat transfer and mass transfer in the burning process; burning reaction dynamics; detonation burning and methods for controlling it; atomizing, evaporation and mixed processing of liquid fuels at high temperatures and under high pressures; mathematical simulation of the burning process, and laser diagnostic techniques applied to the burning process. These are all critical interrelated problems in need of solution in the burning process.

Weather Dynamics and Weather Forecasting Theory and Research

The major, key national basic research project titled, "Research on Weather Dynamics and Weather Forecasting Theory" is a research plan of strategic importance that arises out of the urgent need to get into line with the most recent developments in science internationally, and for the country's modernization. Plans call for this project to go on for 10 years to meet the following overall goals: To make innovative advances at the international level in various aspects of research on weather dynamics, as well as to provide a theoretical basis and methods for the forecasting of catastrophic weather, to improve present forecasting of weather abnormalities in China, and to forecast global weather changes to make a contribution to China's economic construction and social development.

Global Changes and China's Future Living Environment

The objects for research in this project are limited to four basic essentials in the living environment, namely, the atmosphere, water, soil, and plant cover. Changes in these things result from the interrelated roles of the atmosphere,

the hydrosphere, the geosphere, and the biosphere that make up the global system, and the interrelated role of physical, chemical and biological processes, as well as the interaction of man and the environment. The science of global changes that takes study of the overall action of the global system forms the theoretical basis for forecasting the living environment, and has become a leading edge field in contemporary world science. It also has clear applications.

Study and Application of Movements of the Earth's Crust Today and Global Dynamics

Measurement of movements of the earth's crust today and study of its dynamics mechanism is a major topic in modern geoscience, and is also a leading edge science in which geodesy, geophysics, geology, and astronomy overlap.

The China mainland is an ideal place for the study of plates, particularly present day movements and changes in the plates. It is located in a place where many plates press upon each other, and in which internal deformations and the reciprocal movement of various plates is extremely intense. In particular, the uplifting of the Qinghai-Tibetan Plateau and the north-south contraction of the western part of China are hot spots to which scientists from all countries pay attention. Therefore, this research will have a major influence not only on China but the whole world.

Research on the Formation and Evolution of the Qinghai-Tibetan Plateau, Environmental Changes, and the Ecosystem

The uplifting of the Qinghai-Tibetan Plateau is one of the most important events in the history of the globe during the past several million years. This is an ideal area for studying the evolution of the lithosphere and for exploring the mechanism for movements of the earth's crust. The uplifting of the plateau has had a profound effect on the evolution and differentiation of the natural environment on the plateau itself and in adjacent areas. As a distinctive natural regional entity, its ecosystem holds a distinctive position in the entire globe, and it is closely associated with global changes. The regional effect is marked. The Qinghai-Tibetan Plateau is a field of study in which China enjoys distinctive advantages. In terms of the resources environment and natural catastrophes, the plateau is more closely related to man's activities. This project can provide needed scientific data for finding mineral resources on the plateau and adjacent areas, for developing them for use, for forecasting both the trend of changes in the climate and environment and disasters on the plateau and in the country's lowlands, and for the steady development and sustained use of the plateau's main ecosystem.

Basic Research to Locate Ultra Large Mineral Deposits

The laws governing the distribution of ultra large mineral deposits, the conditions under which they are formed, and how to go about finding them are similar in some ways and different in quite a few ways from those that apply to large, medium, and small deposits, which is to say that they have their own inherent attributes. Research for the purpose of intensive development and to find ultra large mineral deposits is necessary for the development of an ultra large mineral deposit theoretical basis, and is also a topic whose comprehensiveness is extremely strong in geodesy.

This project will conduct basic research along the following lines and that is related to finding ultra large mineral deposits: 1. In accordance with the principle of going from the known to the unknown, a thorough analysis will be made of the country's various known ultra large mineral deposits, emphasis going to the study of the mechanisms, laws, and characteristics for the formation of deposits on an ultra large scale to be used as a reference for future work. Second is more research on various key topics related to finding ultra large mineral deposits. Third is comprehensive research on ultra large mineral deposits in areas having long-range prospects.

The Secret Arsenal Beneath Helan Mountain

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[Article by Lian Jun [1670 6511]: "There Is a Secret Arsenal Beneath Helan Shan"]

[Text] At the Beidaihe Conference of the CPC Central Committee Politburo on 18 July 1960.

Mao Zedong was quite excited, saying as he waved his hand: "Let's get going ourselves, start from the beginning, and prepare to have our own atomic bomb within 8 years' time!" At this conference, Mao Zedong issued a call to the entire party and all the people of China: "We must make a decision to work on incisive technology. If Khrushchev will not give us incisive technology, that's great!"

The contradiction that had appeared between the two big socialist countries, China and the Soviet Union, shook the world. It mercilessly cast a heavy shadow over incisive military technology, which China had just started developing.

With no other choice, China's incisive projects in national defense and military industry were pushed to the front stage and became known as "striving to excel projects". Project 905 in Ningxia was part of these striving to excel projects.

Construction of Project 905 was one of the most important and urgent projects for the National Defense Science, Technology, and Industry Commission and its orders demanded that it develop rare and expensive metals urgently needed for China's incisive national defense projects in the shortest possible time: beryllium, tantalum, and niobium.

With the two big camps pitted against each other after World War II, the western capitalist countries established the special "Paris Unified Planning Commission" (abbreviated as the Paris Commission) to blockade and rout the socialist countries. In September 1952, a special "China Commission" was established to serve as the organization for implementing an embargo against China. It also stipulated in explicit terms the scope of materials and technology that absolutely could not be supplied to communist countries for any reason or in any name. Tantalum, niobium, and beryllium products and preparation technology were included.

All this gave even greater stimulus to the patriotic enthusiasm of the sons and daughters of China. From 1964 to 1965, intellectuals and cadres in the Beijing Non-Ferrous Metals Research Academy engaged in the real activity of "good men and women going to the third line, the old, weak, sick, and handicapped staying in Beijing" and came in succession to Helan Shan in Ningxia, opening the curtain for projects to make a good showing under Helan Shan.

From the jokes of several "founding members" who built the plant, we have a glimpse of the poor and arduous conditions at that time: The plant region was designed for 1 million square meters. Fierce winds and blowing sand are a special local product of this area and it was sometimes impossible to see a person just 1 or 2 meters away. To keep the workers from getting lost when they were coming to work, the plant manager hung a red light on the smokestack in the middle of the plant and people used this red light to determine their location. When women comrades were sleeping at night, they had to wrap their heads and put gauze masks over their mouths. Men comrades covered their blankets with plastic cloths and when the day dawned their blankets were heaped with sand. They ate "meals in a big trench", with several 100 people beginning their meals in a large cement trench, mixing salt with their glutinous millet. Cultural life was even more monotonous, with only an outdoor movie each week. There was a serious loss of proportion between men and women and it became hard for young men to find girlfriends, so the state made special arrangements to move a hospital there filled with women from Tianjin. While it may appear now to have been "matchmaking", people at that time were extremely moved.

The poor living and working conditions are hard to imagine, but even less believable was that in just 3 months under this type of conditions, powdered beryllium preparation had formed a laboratory scale. A set of tantalum and niobium processing equipment secretly purchased from Japan arrived in March and they assembled it themselves. Trial production of the first batch of powdered tantalum was done in May and the Japanese businessmen were dumbfounded.

I. Nameless Heroes

Metallic beryllium is highly toxic, especially powdered beryllium, and it can cause destructive damage to the body's skin, lungs, and liver. In a situation of no labor protection during the early periods of plant construction, the employees understood the state's difficulties and said heroically: "we'll do it if the conditions exist, and we'll have to think of a way to do it if they don't!"

There was no place to put the double-housing planer imported from Czechoslovakia, so the workers took action as unskilled laborers, invited several masters, and worked in the frigid month of December, building a work shed and doing the installation. There was no heat in the work shed and the double-housing planer would not operate. Using two asbestos tiles with an electric heater filament in the middle, the "crude heater" was successful! The workers and technicians saw the planer operating, its mechanical sound appearing to be the most beautiful music. However, just at that instant the beryllium content in the work shed exceeded the standard safe dose by several 100 or even over 1,000 times. The beryllium chips flying from the planer fell onto the red electric heater filament and became extremely toxic beryllium oxide gas that filled the air and covered the bodies and faces of the workers with a thick liquid beryllium and water mixture. Was it that they did not understand the chemical and physical properties of beryllium? No! During that fiery era, these heroes had already set their individual safety aside. In the technical process of heating and compressing the powdered beryllium, which had an extremely high beryllium concentration, workers did the operation throughout a period, and they were absolutely in a "forbidden zone" in terms of labor protection theory. The technical personnel did not step back at the sight of this. They worked using their crude methods and worked in turns wearing two layers of gauze masks, and some workers would not stop even after they had been at it for 6 hours.

In May 1969 the state gave Base Area 905 the Project "219" order, which was an important part of developing the hydrogen bomb, and called on them to turn over their products in July. The time was short and the task was urgent. All of the plant's cadres and employees were of one heart and they worked hard day after day, eventually completing their tasks ahead of schedule.

In 1969, China successfully exploded its first high-yield hydrogen bomb and the Central Military Commission and National Defense Science, Technology, and Industry Commission sent Plant 905 a congratulatory telegram expressing their commendations and solicitude to all the employees who had made a contribution to the state under arduous conditions. Leading comrades from the Ningxia CPC, government, and military came to participate in a victory meeting and recorded a grade-3 accomplishment for all the personnel who participated in "209". At the time, an important leading comrade from Ningxia Hui Autonomous Region rewarded these nameless heroes and made an exception by inviting them to eat carp from the Huang He. These leader told several responsible comrades who participated in Project "219": "The state will remember our meritorious service, but because of secrecy you can only be unnamed heroes".

II. Immortal Movements

Twenty-seven years have passed and China's main research center and production base area for beryllium, tantalum, and niobium has been completed on the formerly barren Gobi Desert.

Since its construction during the 1960's, Plant 905 has consistently taken on nearly all of the state's projects to attack key problems in the field of tantalum, niobium, and beryllium, and it has received many awards from the state. According to incomplete statistics, it has completed 200 scientific research projects and developed 800 new products on a trial basis, 40 of which received national and provincial department level S&T progress awards and scientific research achievement awards. Because of space limitations, it would be difficult to list each of the plant's many

magnificent feats, so I can only select a few representative achievements for the benefit of readers.

In the high mountains of the Chong Shan in the southwest of our motherland, there is a top-secret state project. It is China's biggest high-flux atomic reactor at the present time as well as one of the world's largest reactors. The most important part of this reactor, the reactor-type material, was produced and processed by Plant 905. The processing of this reactor-type material, numbered Project "493", was extremely difficult and the precision requirements were extremely high, and there were many products with complex shapes. Under extremely simple protection conditions, the employees of Plant 905 overcame many unexpected technical problems and successfully developed it on schedule, completely attaining the state's design indices and guaranteeing the smooth completion of Project "493".

On 16 October 1982, China successfully launched its first long-range carrier rocket and its warhead accurately landed in the specified area of the sea in the Pacific Ocean with a degree of precision that astounded the world! The rocket was a product of Plant 905.

Airplanes, freighters, missiles, and spacecraft must have guidance systems to attain their expected objectives. Modern guidance systems must have a rapid response and high degree of accuracy without relying on guidance systems with external equipment. Such guidance systems must not be affected by climate, magnetic differentials, electronic interference, willful outside destruction, and so on. At present, only inertial guidance systems can satisfy these strict requirements.

Because of the extremely high strength and excellent stability of beryllium metal, it has become the most ideal and irreplaceable material for the gyroscopes used in inertial systems.

Since Plant 905 assumed responsibility for the extremely important inertial guidance beryllium material project, it has invested its most powerful manpower and materials and organized attacks on key problems in the entire process from beryllium bead smelting, beryllium powder preparation, powder molding, consolidation, analysis, performance inspection, and so on. Now, some of the various performance indices for its beryllium material have attained international levels.

On 9 July 1988, China successfully launched its first meteorological satellite, the "Fengyun-1". The satellite transmitted meteorological cloud charts with an extremely high degree of clarity from cosmic space. The Central People's Television Station also gave special emphasis to the fact that the meteorological cloud charts it uses in its evening weather forecasts were transmitted by China's "Fengyun-1" meteorological satellite. If the people of Ningxia knew that the optical lenses that serve as the eyes of the "Fengyun-1" satellite had been produced by Plant 905, they would be extremely proud.

III. A Second Pioneering Venture

As we entered the 1980's, Plant 905, which had time and again made unique contributions to construction of the national defense industry, also fell into difficult straits. With China's large troop reductions and acute reductions in military industry requirements, the Central Military Commission decided to allow some military industry enterprises to shift over to civilian product production, and Plant 905 was one of them.

This military industry base area, which had relied on the state to assign its scientific research topics, whose production relied on materials ordered from military industry, and whose expenditures were provided in their entirety by the state, suddenly leapt into the difficult straits of being responsible for its own profits and losses to survive and for a while it looked as if it would be hard to adapt. In 1981, China as a whole ordered only 250 grams of powdered beryllium but the entire plant's yearly output was 20 tons! Because of the acute reduction in military industry orders, this huge base area with fixed assets of nearly 100 million yuan had a gross value of output of only several million yuan in 1983!

The situation was serious and, added to their many debts over the years for living and welfare facilities, a substantial number of people transferred back to the interior and large cities.

Should they sit and wait for death, or go heroically into the surging flow?

The cadres and employees of Plant 905 are truly heroes who have been through 100 battles, and most of them stayed. They united in one heart and confidently started their second pioneering venture!

New products are being developed in an unending stream and the number of new product varieties has continually grown. They completed their lithium niobate monocrystal production line in 1984 and the high-purity niobium oxide production line went into operation next. Their tantalum filament production line has now attained a preliminary scale. In 1985, their beryllium-copper sheet and band production line and capacitor production line were completed in succession. In 1986, they started construction on an industrial silicon and niobium tubing production line. In 1987, their aluminum fluoride and steel ball production line produced products in succession. At the same time, they also established a technology development company whose functions are to absorb, digest, and ship out technology. In the past 3 years, they have also newly built and expanded an industry silicon branch plant in Dujiang Yan City, Sichuan and an industrial silicon branch plant, lithium niobate, beryllium- copper sheet and tubing, and aluminum fluoride production lines in Guwuchuan in Inner Mongolia. They have also imported a production line from the United States that can produce 50 million tantalum capacitors a year, and after it goes into production it will become Asia's biggest tantalum capacitor production plant. Through its unremitting efforts, Plant 905 has now formed an omnidirectional management configuration.

Walking out of their difficulties, they have seen the light of dawn. In 1990, Plant 905's value of output reached 37 million yuan and it had profits and taxes of 5 million yuan. In was upgraded to a state grade-2 enterprise in 1992. Now,

the people at Plant 905 are taking a major step toward their goals they have set themselves for the Eighth 5-Year Plan of 100 million yuan in value of output, 10 million yuan in profits, 140,000 yuan in taxes, and upgrading to a state grade-1 enterprise.

Catch-Up in Integrated Circuit Production Planned

93FE0051B Beijing KEJI RIBAO [SCIENCE AND TECHNOLOGY DAILY] in Chinese 8 Sep 92 p 1

[Article by Correspondent Ji Hongguang [1323 3163 0342]: "Deployments For China's Integrated Circuit Special Development Plan"]

[Text] In order to turn around the backward situation existing in the integrated circuit industry, China recently began implementation of a very-large scale integrated circuit development plan in an effort to master integrated circuit high precision, large scale production technology during the Eighth 5-Year Plan to create a certain production capacity. State Council Deputy Premier Zou Jiahua [6760 1367 5478] has agreed in principle on problems pertaining to plan implementation.

Integrated circuits form the foundation of modern high technology industries. In plotting economic development, every country of the world gives them an important place. Despite a certain foundation, China's integrated circuit industry remains at a relatively low level, and it has become a factor limiting economic development, technical progress, and improvement of the equipment level. Therefore, in 1990, the Ministry of Machine Building and Electronics proposed an integrated circuit special development plan for China. Now, following State Planning Commission validation, conditions are deemed to exist for its implementation. An all out effort can begin.

At a work conference on the subject held several days ago, Vice Premier Zou Jiahua said that orientation toward the market and satisfaction of demand is the basic guiding doctrine for development of China's integrated circuit industry. He called for consideration of project construction and industrial development in terms of national economic development, demand driving the scale of industry and the level of technology. He believes that China's integrated circuit production must follow a course of manufacturing mostly special purpose circuits while also giving attention to circuits in common use. Special purpose circuits must be of many different kinds, in different amounts, and meet all needs. China's need for integrated circuits in common use that can be purchased internationally and whose price has fallen very low can be met through imports. Zou Jiahua stressed the need to give full attention to design and development of different kinds of integrated circuits, a number of product design and development centers being set up nationwide to stimulate development of an integrated circuit design industry. In addition, full use must be made of the favorable environment attending the opening to the outside world to conduct active international cooperation, doing everything possible to import from abroad advanced technology and equipment, as well as experts possessing real ability and learning. This will enable China to get a head start in the development of its integrated circuit industry.

In discussing organization and management for plan implementation, Zou Jiahua said that this is an important piece of national microelectronics systems engineering during the Eight 5-Year Plan that requires treating the whole country as a chessboard and unified organization. No single department or enterprise can shoulder it alone. Reportedly the State Planning Commission masterminded the plan, the Ministry of Machine Building and Electronics organizing its implementation. Implementation plans call for the building and coming on stream of a substantial portion of the project during the Eighth 5-Year Plan.

Guangdong High Technology Industry Development Plan

93FE0051H Guangzhou GUANGDONG KEJI BAO in Chinese 29 Aug 92 p 1

[Article by Ye Weisheng [0673 4850 3932]: "Magnificent Blueprint For Building 'Guangdong Science and Technology High-Rise'. Two Provincial Science and Technology Commission-Formulated 'Programs' For the Development of High Technology Industries Inaugurated"]

[Text] A high technology industry development blueprint for Guangdong to overtake Asia's "four small dragons" within 20 years is unfolding across the good earth of southern Guangdong. The two "programs," which the provincial Science and Technology Commissions took the lead in developing, have been formally inaugurated. These are the "Guangdong Province 10-Year Torch Plan For Development of High Technology Industries and the Eighth 5-Year Plan Program" and the "Guangdong Province 10-Year Plan for High Technology Industries in the Zhu Jiang Delta, and the Eighth 5-Year Plan Program." The provincial government has approved the second of these "programs" and recently forwarded it to the cities and counties concerned for implementation.

According to a briefing from an official in the provincial Science and Technology Commission who is responsible for high technology industries, Guangdong scored heartening achievements in high technology industries during 1991. Statistics from 357 high and new technology enterprises throughout the province show the production of 662 different high and new technology products for sales revenues totalling 8.5 billion yuan. This includes 2.1 billion yuan from exports on a research investment of 400 million yuan. Three zones and parks, namely the Tianhe High and New Technology Industry Development Zone in Guangzhou, the Shenzhen Science and Technology Industrial Park, and the Zhong Shan Torch Plan High and New Technology Industry Development Zone produced high and new technology products having an annual output value totaling $719 million. These achievements lay a solid foundation for the drafting of the two "programs."

These two "programs" firmly implement the strategic thought of "develop high technology to realize industrialization." They make torch plans a "turnkey" for the development of high technology industries in Guangdong Province; they hasten the commercialization, the industrialization, and the internationalization of high and new technology achievements; and they stimulate tertiary industries. Their goal is

between 250 and 300 high and new technology industries throughout the province by the end of the Eighth 5-Year Plan, the employment of 240,000 people, the development of 1,000 different high and new technology products, and an output value of 35 billion yuan, 30 percent of which comes from exports. By 2000, the province is to have 350 high and new technology industries, employ 500,000 people, and develop another 1,000 different high and new technology products, output value from high and new technology enterprises throughout the province totaling 110 billion yuan, 40 percent of it from exports.

During this period, the focus of high and new technology development is to be on the following: the electronics information industry, integrated machine building and electronics industries, high grade fine chemical industries, high and new technology light and textile industries, and new technology energy and environmental protection industries.

The main location for such industries is to be the Zhu Jiang Delta high technology industrial tract. Guangzhou is to concentrate on the development of information equipment, digitally controlled numerical display machine tools, and new foods; Shenzhen is to emphasize development of electronics, medical treatment equipment, medicinal foods, and biological manufactures; Foshan is to concentrate on the development of intelligent electrical household appliances, and new types of compound materials; Zhuhai is to concentrate on the development of medicinal plant manufactures, and new sources of chemical energy; Zhongshan, Jiangmen, Huizhou, and Dongguan cities are each to have a development project emphasis as well.

The provincial CPC committee believes that many support measures are required for the development of high technology industries such as the intensification of system reform, the building of a management and operating mechanism that is in keeping with the development of high technology industries; the building of a multi-component, multi-channel investment system; active training up and bringing in of skilled personnel; and remedying weaknesses in translating scientific and technical research achievements into productivity, etc. The provincial Science and Technology Commission is bending efforts to these tasks right now. It is believed that under the leadership of the provincial CPC committee and the provincial government, with vigorous support from the State Science and Technology Commission and departments concerned, and through the efforts of the people throughout the province, the province's blueprint for development of high technology industries will certainly be realized.

CAS' Computer-Assisted Design Achievements

93FE0051I Beijing BEIJING KEJI BAO [BEIJING SCIENCE AND TECHNOLOGY NEWS] in Chinese 12 Sep 92 p 1

[Article by Correspondent Shi Wenjie [0670 2429 1240]: "A High Level Research and Demonstration Base—Report on the Chinese Academy of Science Computer Institute's Open Laboratory For Computer Assisted Design (CAD)"]

[Text] At a May 1992 meeting for the purpose of reporting and demonstrating achievement, the Chinese Academy of Science Computer Institute's Open CAD Laboratory unveiled 38 pieces of software that it has developed. When researchers from the Tokyo Municipal Consolidated Research Institute visited this laboratory recently, they were astounded at the achievements it has made. They expressed a desire to work with the open CAD laboratory on joint development and research work. Experts from Germany's Tryco Corporation were extremely pleased after testing the laboratory's EDCADS software, and decided to act as a sales agent for the software and to cooperate further with the open CAD laboratory.

The Chinese Academy of Sciences Computer Institute began work on computer- assisted design research during the late 1960's. By 1987, in response to urgent needs, the Chinese Academy of Sciences authorized the founding in the institute of the open CAD laboratory in September in order to facilitate research in this basic field. It gathered together more than 240 outstanding personnel from 41 units, and emphasized research on CAD, computer assisted testing, computer graphics, and engineering project data banks.

Once founded, thanks to the efforts of countless research personnel, the Chinese Academy of Science Computer Institutes Open CAD Laboratory scored many breakthroughs in basic research and in research and development of high level CAD systems. It also took on 22 major projects including the national Seventh 5-Year Plan, the "863" high technology plan, and the national natural sciences fund. Achievements have been successfully applied to the fields of electronics, machinery, construction, geography, cybernetics, project management, and technology. The "integrated electronic equipment CAD system (EDCADS)" that they successfully researched meets advanced international standards. Its software engineering may be applied to the designing of all sorts of electronics equipment. The "Computer Geographic Graphics Simulating System" employed computers to draw China's first large scale three dimensional topographic maps. In September 1991, this earliest sample map attracted the great interest of all countries and scholars attending "The 15th International Mapping Conference" and the "International Map Exhibition" at Bournemouth in the United Kingdom. They all praised it as a computer-produced three dimensional topographic map. This same technique may be applied to the making of all sorts of specialized maps, to military navigation, to national land management policy, and to water conservancy and transportation plans. The "Chinese Classical Gardens Three Dimensional Modelling Software GDM" and the "Chinese Ming and Qing Imperial Gardens Three Dimensional Simulation System" can realistically depict on a computer screen lifelike images of the garden landscapes. By changing the point of view and the line of vision, the artistic sense of a tourist actually in the ancient imperial gardens can be dynamically simulated.

Not only has the Chinese Academy of Sciences Computer Institute's Open CAD Laboratory devoted close attention to scientific research and the development of technology to

make a contribution to development of the national economy, but it has also trained up a number of high level experts for the nation, including 45 doctoral graduates, doctoral candidates, and 45 masters degree candidates. Eight have obtained doctorates and nine have received masters degrees. One has received a Chinese Academy of Sciences director's award special class, and three have received outstanding achievement awards.

Because of its outstanding achievements in scientific research and the training of skilled personnel, the Chinese Academy of Sciences Computer Institute's Open CAD Laboratory is generally acknowledged to be a high level research community that has begun to become China's CAD research and demonstration base.

New Microelectronics Company for Pudong Development Zone

93FE0051G Beijing ZHONGGUO DIANZI BAO [CHINA ELECTRONICS NEWS] in Chinese 26 Aug 92 p 1

[Article by Correspondent Mao Xifang [0379 6932 5364]: "Zhangjiang Corporation Invests in Microelectronics Development"]

[Text] On 14 August, signing ceremonies were held in Shanghai for the founding of the Shanghai Municipal Zhangjiang High Technology Industry Joint Development Corporation in which the Shanghai branch of the Chinese Academy of Sciences and the Zhangjiang High Technology Park Development Corporation in the Pudong Development Zone jointly invested 68 million yuan.

This jointly developed 200,000 square meter parcel of land is to be used primarily for the founding of the Chinese Academy of Science's Pudong High Technology Park. High and new technologies, including microelectronics and board making technology, optoelectronics and optical disk technology, laser processing technology, ultra-sound technology, sensor technology, new materials technology, and nuclear technology are to be developed in this park.

Chongqing Planning Optoelectronics Industry

93FE0051F Beijing ZHONGGUO DIANZI BAO [CHINA ELECTRONICS NEWS] in Chinese 18 Sep 92 p 1

[Article by Han Lianguo [7281 6647 0948]: "Chongqing Takes the Lead in Inviting Experts to Work on Site; Masterminds Development of Optoelectronics Industry"]

[Text] Chongqing Municipal CPC Deputy Secretary Jin Lie [6855 3525], and Deputy Mayor Qin Changdian [4440 2490 0368] invited 15 experts and scholars from the Beijing Chinese International Engineering Consulting Corporation to come to the Electronics Bureau to perform on-site work from 12 through 22 October. They evaluated implementation plans for a new and high technology industry that is slated for priority development in the city's 10-year national economic and social development plan, and in the Eighth 5-Year Plan—Chongqing's optoelectronics industry.

Chongqing's electronics industry is strong in its ability to produce complete machines such as communications equipment, special purpose (military use) computers, radio broadcasting and television testing devices, and air purification equipment in all of which it holds a substantial advantage over other plants in the same industry nationwide. However, its basic components production capabilities are weak, its support facilities are poor, product quality is low, and its niche in Chongqing's industrial structure is relatively small.

During the period of the on-site work, the municipal CPC committee, city government leaders, and teams of experts and academicians listened to a reading of *Special Plan For Chongqing's Development of Optoelectronic industrialization*, and reports on 11 main projects, and they conducted on-site surveys and studies in the units concerned. They unanimously decided that the decision of the municipal CPC committee and the municipal government on vigorous efforts to develop optoelectronics technology and to make Chongqing a Chinese optoelectronics industry base was correct and farsighted. At the same time, they noted that development of optoelectronics products should be done with reference to the technology base, market prospects, economic returns, availability of financing, and investment risk. Emphasis should be placed on matters such as a good technological base for CCD cameras, CCD picture phones, and laser printers; a good market, good returns, and slight risk; assembly of large amounts of human, financial, and material resources, willingness to battle into the front ranks, ability to ensure the formation of an industry, and real ability to build large scale production to become a national force. For projects such as CCD fax machines, scanners, infrared remote control broadcasting and receiving equipment, for which the technology is basically mature, economic returns good, and market competition intense, opportunities must be seized and actions taken as capabilities permit. For liquid crystal television, laser video disc players , and CCD electronic cameras, for which the technical base is rather weak, the market uncertain, and risks substantial, prudence should be the policy, holding off for the time being in trying to build an industry. The experts provided many valuable suggestions about the orientation, emphasis, steps, and problems to be watched in implementing the plan. In this connection, Deputy Mayor Tai Changdian said that municipal government departments concerned want to coordinate closely with the Electronics Bureau in completing implementation plans, doing a good job of negotiation on CCD joint ventures in order to ensure the complete transfer of CCD design and manufacturing technology to lay a foundation for Chongqing's optoelectronics industry.

Major Changes in S&T Information Agencies

93FE0051C Beijing GUANGMING RIBAO in Chinese 16 Sep 92 p 1

[Article by Correspondent Liu Jingzhi [0491 2417 2535]: "Major Reform of China's Scientific and Technical Information Apparatus in the Offing. Gradual Shift in Function From Serving the Public to Serving Science and Technology. Use of Market-Oriented Business-Style Management in a Major Effort To Develop an Information Services Business and Industry"]

[Text] Beijing, 15 September—The following was obtained from the All China Science and Technology Information Work Conference convened in Beijing today. A major reform of China's science and technology information apparatus is in the offing that will change the existing situation in which the science and technology information apparatus functions solely for the benefit of the public and is completely dependent on the government for support. Except for a small number of agencies engaged in basic research and service functions in the science and technology information fields, which will continue to receive steady support from the state or local governments, most scientific and technical information agencies will gradually change their function from serving the public to serving science and technology. They will institute business-style management and establish self-development mechanisms filled with vigor and vitality. All science and technology information agencies must become oriented toward the market in the vigorous development of an information service business and industry.

In the allocation of human talent, in addition to maintaining a crack corps that will continue to do basic information research and provide information services of a public service nature, efforts will be made to allocate approximately 50 percent of personnel within 3 to 5 years to information service businesses and industries of a scientific and technical service nature, as well as to other tertiary industries. In addition, all science and technology information personnel will be encouraged to find various ways and means to provide services to areas developing high and new technology, to coastal areas opened to the outside world, and to special economic zones, as well as to large and medium size business enterprises, township and town enterprises, and medium and small cities.

In changing their mechanism, science and technology information organs must institute a reform policy of "steadily improving one end while removing restraints on and enlivening a wide area," instituting two different operating mechanisms. One is basic information and research of a public benefit nature mostly for the performance of government command-style tasks; the other is a science and technology service business and service industry that is oriented toward market demand. In selecting the key agencies to which they will provide support, both the state and local governments must prescribe the amount of operating expenses and the table of organization that the post-restructuring tasks of the agencies will require. Operating expenses must be allotted in a lump sum for apportionment within the agencies, and the amount should be increased year by year. For independent information agencies that provide scientific and technical services in response to market demand, as well as for that portion of all kinds of scientific and technical information agencies that provide scientific and technical services, a policy of self-support and development is to be instituted. The first step should be to promote business-style management in public agencies, those that are able to do so operating as business concerns. The second step should be to make them completely self-supporting in the funds they need for wages, bonuses, welfare services, and institutional development. Beginning in 1993, their operating expenses should be cut between 10 and 20 percent each year, a 60 percent cut being in place within 3 to 5 years. This saving in the use of public funds for operating expenses should be transferred to the agencies that provide service to the public for use as a development fund.

Another report says that the State Science and Technology Commission has decided, effective from the beginning of this conference, to change the name of its Science and Technology Intelligence Department to Science and Technology Information Department, to change the name of the Chinese Science and Technology Intelligence Institute to Chinese Science and Technology Information Institute.

Information Service Industry Being Developed

93FE0005G Beijing RENMIN RIBAO OVERSEAS EDITION in Chinese 16 Sep 92 p 3

[Article by Correspondent Li Xiguang [2621 1585 0342]: "China Vigorously Develops Information Service Industry. Develops Information Resources; Improves Sharing"]

[Text] Xinhuashe, Beijing 15 September— China intends to develop information resources and improve the extent of sharing and the utilization rate of information resources in an effort to build a complete national science and technology information network that serves society better, is run more like an industry, and is more fully networked before 2000.

The above information was revealed at the National Science and Technology Information Work Conference that the State Science and Technology Commission opened today. This complete national science and technology information network includes various kinds of information relating to science and technology, the economy, consulting, patents, archives, and the technology market. No fewer than 20 million items of data in Chinese characters will be recorded for public use, and the Chinese character data bank for private use will include 100 million items. The data bank in western languages will include 40 million items. Every jurisdiction in the country having a microcomputer and a direct telephone line can become a network terminal. The network will accommodate no fewer than 2000 terminals, and will be connected to more than 10 major information systems worldwide forming a core system for national science and technology information.

Reportedly the national science and technology information computer service system currently has more than 110 international terminals in 50 cities, and it is connected to 12 large information systems outside China. It can search several hundred million information records in more than 600 data banks.

A person in charge at the National Science and Technology Commission noted, however, that the output value of China's information service industry is very low. Its output value is only several billion yuan renminbi, less than 1 percent of total world output value. Furthermore, China's information processing techniques are still in the hand processing stage; 90 percent of information resources have yet to be put in electronic form, and the utilization rate is very low.

In addition, the State Science and Technology Commission disclosed that China's per capita amount of information resources is very low. China publishes 15 billion Chinese characters a year, fewer than 15 characters per citizen. Nationwide, there is only one newly published book for every 4 people. The energy and the raw and processed materials that China uses to produce $1 worth of goods each year is between 2 and 5 times that of developed countries, but the amount of information it consumes is only one-tenth the world average.

Within the next 5 years, the National Science and Technology Commission hopes to spread new services including electronic mail, electronic data exchange, electronic bulletin boards, and video text. It will try to develop and produce Chinese character laser disc data banks, and develop both electronic publications and multimedia technology.

Theoretical Military Research Invigorated

93FE0005A Beijing GUANGMING RIBAO in Chinese 25 Jul 92 p 1

[Article by Correspondent Li Dan [2621 0030] and Reporter Jiang Wenming [1203 2429 2494]: "PLA Military Research Never More Lively. A Number of Theoretical Military Works Published; Emphasis on Exploring Modern Defense Problems"]

[Text] A 25 July report on a lecture commemorating the 65th anniversary of the Chinese PLA, the Academy of Military Sciences, and the Military Science Association has disclosed an unprecedented liveliness in the armed forces military research field during the more than 10 years of reform and opening up to the outside world. It has been the most bountiful golden age for scientific research achievements since the founding of the PLA.

In the military theory research field, the military works of Marx and Engels were revised and retranslated, and the writings on military theory of Mao Zedong and Deng Xiaoping were edited and annotated, a number of rather valuable works on military theory written and published including *Chinese Encyclopedia - Military, Strategy,* and *National Military Organization.* In addition, units such as the Academy of Military Sciences conducted academic exchanges with military research organizations and scholars in 10 countries and territories of the world, and invited nearly 100 foreign experts and scholars to visit China. They also organized several delegations or sent individuals abroad to take part in international academic exchanges.

Another trend in scientific research throughout the armed forces was the increasing attention that researchers paid to practical problems such as the PLA's present organizational system, trends in the development of armaments, reform of military training, and China's national defense in 2000, all of which have become a focus for research workers' examination and discussion. Military science has been made a part of the national science system as an independent scientific discipline. Simultaneous with the diversification of research topics has been a modernization of research methods. Cybernetics, systems theory, information theory, mathematical methods, and computers were widely applied to military science research. During the past more than 10 years, the entire armed forces has made a number of major accomplishments in research on simulated combat and command automation, applying military operations research and military engineering theories. Throughout the armed forces, nearly 1,000 research models on strategy, campaigns, and tactics, military expert simulation systems, and authentication models for selected topics have been established. Use of scientific experiments to simulate modern combat, and use of quantitative and qualitative analysis methods in combination to portray modern warfare have become a reality.

Assignment of Young People Emphasized in S&T System Reform

93FE0051A Beijing KEJI RIBAO [SCIENCE AND TECHNOLOGY DAILY] in Chinese 7 Sep 92 p 1

[Article by Correspondent Han Yuqi [7281 3768 3825]: "China Reforms Its Scientific and Technical Personnel Assignment System. *State Science and Technology Commission and State Commission For Restructuring of the Economic System Prepare Regulations on Allocation of Human Talent*"]

[Text] The long moribund scientific and technical personnel assignment system is about to undergone major reform. Wages of scientific and technical personnel engaged in basic research, high technology research, major engineering projects and key research topics will be raised enormously. This is the proposal made in *Various Views on Allocation of Human Talent, Structural Readjustments, and Further Intensification of Science and Technology System Reform,* which the State Science and Technology Commission and the State Commission for Restructuring of the Economic System issued on 27 August.

Various Views is divided into six parts, the principal substance of which is as follows: the significance of human talent allocation; scientific and technical tackling of permanent basic research, high technology research, major project construction and key projects, as well as providing full support for them; technical development organ multichannel allocation, following a course of creating scientific and technical enterprises, conglomerates, and developing high and new technology; social benefit institutions and scientific and technical services institutions to be firmly rooted in economic, social, and scientific and technical development for the gradual formation of new tertiary industries that are organizationally networked, socialized in function, and industrialized in the way they provide services; development of scientific and technical enterprises for the optimum organization of scientific and technical achievements and all kinds of key production elements, creating new experiences and shaping a macroclimate to advance the entry of science and technology into the economy; and impetus to the allocation of human talent on the scientific and technical front for full expression of respect for knowledge and respect for human talent.

Various Views says that the scientific and technical personnel assignment system must be consistent with the reform measures for "stabilizing one end while removing

restraints over a wide area," not only enormously raising the wages of scientific and technical personnel engaged in basic research, thereby stabilizing one end, but also gradually making the wages and benefits of those who have reached the international level and an advanced domestic level proportionally close to those provided internationally. Wages and benefits for scientific and technical personnel engaged in technical development, scientific and technical services, and research having social benefit must be further decontrolled, compensation calculated on the basis of the economic returns they produce, subject to approval of the authorities concerned. All scientific and technical enterprises, conglomerates, and high and new technology enterprises are to follow the principle of enterprises providing pay and benefits primarily in accordance with work performed, all other forms of remuneration being supplementary, the enterprises themselves deciding internal wage and bonus distribution methods. Contract law and patent law provisions are to be fully and diligently implemented with respect to withholdings from returns gained from the application of technical research achievements and from inventions and creations for use in encouraging and rewarding those responsible for the technical achievements; further protection is to be afforded intellectual property rights; and the spiritual rights and economic rights of scientific and technical personnel are to be protected. All jurisdictions and all firms are to be permitted to draw up and implement on a trial basis in accordance with legal principles policies for conferring high honors and substantial awards on those making outstanding contributions. In accordance with international practice, the wages of scientific and technical entrepreneurs and outstanding managers who make a contribution to scientific and technical progress are to be between three and five times the average wage in their unit.

Various Views also proposes that scientists and all types of experts of the older generation who performed immortal deeds in promoting the development of scientific and technical endeavors should have their right to enjoy preferential social assistance following retirement while continuing to play an active role. Middle age and young key cadres should be more trusted politically, permitted more discretion in how they do their work, and provided better care in their daily life, a fine competitive environment created, and capable people promoted to important positions. A free hand should be given to permit large numbers of outstanding young scientific and technical personnel who possess new knowledge to move into key technical positions and managerial positions for the training up a number of luminaries and academic leaders in the new scientific and technical revolution.

Measures to Attract S&T Personnel to Return to China

93FE0005D Beijing RENMIN RIBAO OVERSEAS EDITION in Chinese 1 Sep 92 p 4

[Article: "State Natural Sciences Fund Committee Announces Regulations on Financial Assistance to Chinese Personnel Studying Abroad Returning to China to Work and Lecture For Short Periods"]

[Text] **Article 1.** By way of showing active concern and support for Chinese students studying abroad and students remaining abroad following completion of their studies (hereinafter termed students abroad), and to set the stage for them to take part in research on national natural science fund projects, put their intelligence and wisdom to use, and make a contribution to scientific and technical endeavors in the motherland—particularly to make a contribution to basic research and applied basic research—the National Natural Sciences Fund Committee (hereinafter termed the Sciences Fund Committee) has decided to allocate special funds to set up a fund to provide financial assistance to students abroad returning to China to work and lecture for short periods.

Article 2. The main recipients of financial assistance from this special fund are outstanding middle age and young scientists and technicians who have received a doctorate degree (including those who have obtained long-term (or permanent) residence abroad, or who qualify for re-entry into the country where they studied). In order to obtain financial assistance, the following conditions must be met: (1) the person must have an outstanding academic record and have recently published an exceptional academic thesis in an influential academic journal, or received an exceptional natural sciences award, or made an outstanding invention or creation; (2) has made arrangements with a receiving unit in China and has been accepted for short-term work and lectures following return to China. Other students abroad who meet the above requirements may also receive financial assistance.

Article 3. This special fund to support the Sciences Fund Committee's project charter includes the following activities in all academic fields: (1) Research on national natural science fund projects; (2) lecturing in study groups and workshops that are part of national natural sciences fund projects; and (3) participation in all kinds of academic conferences in China and giving specially requested reports.

Article 4. Application Procedure

(1) Applicants must apply for financial assistance to the Sciences Fund Committee through the unit in China receiving them. The receiving unit must fill out "National Natural Science Fund Committee Financial Assistance Application for Chinese Students Abroad Returning to China To Work and Lecture For Short Periods," attach to it the student's letter requesting return to China to lecture and work for a short period together with data testifying to his academic achievements, and send it to the academic fund committee department concerned; (2) should uncertainty exist about how to get in touch with the receiving unit, the applicant may either go through a Chinese embassy or consulate or contact the International Cooperation Bureau of the Science Cooperation Committee directly for assistance in making arrangements with the receiving unit; (3) on the basis of the amount of financial assistance funds available to the special project fund, in January of each year the Sciences Fund Committee will publish the number of people to receive financial assistance, and it will consider applications from Chinese students abroad throughout the year and make selections for financial assistance to the total number

prescribed. After considering applications, it will promptly reply to both applicants that have obtained and have not obtained financial assistance.

Article 5. In principle, this special fund provides financial assistance for part or all the expenses of students abroad during their stay in China (including housing, food, transportation, and research expenses). Request may be made to the receiving unit should the amount not cover expenses.

Article 6. The special fund to provide financial assistance to students abroad returning to China to work and lecture is administered by the International Cooperation Bureau of the Sciences Fund Committee. The International Cooperation Bureau is responsible for interpreting these regulations.

Lenient Policy Attracts Overseas S&T Personnel

93FE0005E Beijing RENMIN RIBAO OVERSEAS EDITION in Chinese 5 Sep 92 p 3

[Article by Correspondent Song Bin [1345 2430]: Chinese Science and Technology University Drafts Lenient Regulations. Large Numbers of Students Abroad Return To Make Contribution and Build Career"]

[Text] Xinhuashe Hefei, 4 September—After returning to China upon completion of his studies, physics graduate student Chen Yongcong [7115 3057 5115] returned to the United States for 3 months of advanced study in 1991. More than 80 percent of those studying at Chinese Science and Technology University frequently go abroad as Chen Yongcong did.

Since Chinese Science and Technology University drafted lenient regulations for "free entry and exit" in 1987, it has attracted numerous students from abroad. Now, approximately 360, or more than 70 percent of the personnel that the university sent abroad for study, have returned to China upon completion of their studies. They are now making a contribution and building careers in teaching, research, and administrative posts at the university.

Worry about not having another opportunity to go abroad once they finish studies and return to China has been a general frame of mind of students studying abroad in recent years. In view of this attitude, leaders at Chinese Science and Technology University decided that scientific knowledge required updating and academic exchanges were required at institutions of higher education training human talent. Training of top flight talent required understanding of most recent scientific and technical developments in the world. Only by understanding one's own circumstances and the circumstances of others was it possible to spell out goals for catching up and overtaking others. Therefore, beginning in 1987, Chinese Science and Technology University drafted a body of "free entry and exit" regulations for students studying abroad that provided that 1 year following their return to China they could go abroad again for 3 months as their teaching duties or research work required. Two years following their return, they could go abroad again for ½ year, and 4 years following their return, they could go abroad again for 1 year. In addition, they could accumulate the time. The appearance of this regulation was immediately welcomed by students studying abroad. It eliminated nagging worries, and the number of students returning to China upon completion of their studies abroad increased. At the same time, active support was given students who had returned to China to make short-term visits abroad to take part in international academic conferences, and to attend school. Giving the green light set the stage for them to improve their academic attainments.

Institution of the "free entry and exit" regulations not only induced the return to China of large numbers of students studying abroad, but also permitted steady improvement of the teaching and research level of personnel returning to the university upon completion of their studies. Following the 1982 return from London University's Science and Engineering Institute of Fan Weideng [5400 4850 3397], a deputy director and teacher from the thirteenth class, following completion of his studies, he went abroad again four or five times for advanced study. He was credited for many achievements in setting up the first national conflagration science laboratory at Chinese Science and Technology University, and in research on conflagration science. Wu Yicheng [0702 0110 2052], a student studying abroad from the twelfth class, went abroad for study and exchanges several times in connection with work on a non-linear crystals research project, finally scoring a major breakthrough.

Synthesis, Separation of Fullerenes C_{60}/C_{70}

40100029A Wuhan WUHAN DAXUE XUEBAO [JOURNAL OF WUHAN UNIVERSITY (Natural Science Edition)] in Chinese No 3, Sep 92 pp 121-125

[English abstract of article by Chen Sunian, Zhu Ling, et al. of the Department of Modern Analytical Science, Wuhan University; MS received 1 Jun 92]

[Text] C_{60}/C_{70} was synthesized by vaporizing graphite rods using self-designed apparatus. It was extracted from soot with benzene or toluene. After slowly evaporating the solution, a brown or black solid material was left. The yield was 9 percent. Mass spectroscopy shows that it contains mainly C_{60} and small amount of C_{70}. In transmitted light the crystals appear red-brown in color and have some kinds of crystalline forms.

The mixture of C_{60}/C_{70} was subjected to column chromatography using neutral alumina or graphite. Column chromatography on neutral alumina with n-hexane as eluent gave satisfactory separation in milligram quantities. Pure fractions containing C_{60} (> 99 percent) were obtained. Column chromatography on graphite with n-hexane-toluene as eluent gave an excellent separation in more than 100 milligram quantities. Pure fractions containing C_{60} (> 99 percent) were obtained quickly. The results show that improved column chromatography on graphite is a simple and effective separation method for obtaining pure C_{60}.

Raman Spectroscopic Study of Fullerene C_{60} Films Coated on Different Substrates

40100029B Wuhan WUHAN DAXUE XUEBAO [JOURNAL OF WUHAN UNIVERSITY (Natural Science Edition)] in Chinese No 3, Sep 92 pp 126-130

[English abstract of article by Xu Zhisan, Hu Jun, et al. of the Department of Modern Analytical Science, Wuhan University; MS received 1 Jun 92]

[Text] The fullerene—C_{60} film coated on surface of Ni, Si, Cu, Ag, KBr and quartz plate and adsorbed on surface of Ag film were studied by Raman spectroscopy and surface-enhanced Raman spectroscopy (SERS). The different changes of relative intensity and depolarization ratio ($\rho = I_{perp.}/I_{paral.}$) of Raman bands of C_{60} films on different substrates were observed. Some new Raman bands were also observed in SERS spectrum of C_{60}. These results can be explained by the interactions between C_{60} and surface of substrates. The results suggest that the spherical fullerene C_{60} molecule with I_h symmetry can be used as a probe to investigate adsorbate-surface interactions.

X-Ray Electron Spectra of Fullerenes C_{60}/C_{70}

40100029C Wuhan WUHAN DAXUE XUEBAO [JOURNAL OF WUHAN UNIVERSITY (Natural Science Edition)] in Chinese No 3, Sep 92 pp 131-134

[English abstract of article by Yang Yezhi, Mo Shaobo, et al. of the Department of Modern Analytical Science, Wuhan University; MS received 1 Jun 92]

[Text] The X-ray photoelectron spectra (XPS) of C_{1s}, the valence spectra and Auger electron spectra (C_{KLL}) of C_{60}/C_{70} fullerenes and graphite obtained with Mg K_α radiation are reported and discussed in this paper. The results show that the hybridization of the carbon atoms in C_{60}/C_{70} fullerenes is essentially sp^2 state with some sp^3 character. The XAES is probably a sensitive and effective method for characterization of C_{60}/C_{70} fullerenes and graphite.

Electron Ionization Mass Spectrometry of C_{60} and C_{70}

40100029D Wuhan WUHAN DAXUE XUEBAO [JOURNAL OF WUHAN UNIVERSITY (Natural Science Edition)] in Chinese No 3, Sep 92 pp 135-138

[English abstract of article by Jing Zhizhong, Wang Meilan, Chen Sunian, Zhu Ling, Li Guihua, Hao Guangming, and Sheng Rongsheng of the Department of Modern Analytical Science, Wuhan University; MS received 1 Apr 92]

[Text] The positive- and negative-ion mass spectrometry of C_{60} and C_{70} using electron ionization and In-Beam method is reported. The triply charged ions have been observed in the positive-ion mass spectra. The relative intensity of doubly and triply charged ions were affected strongly by electron energy. Relationship between the intensity of negative molecular ions and electron energy has been reported as well.

Enzymatic Synthesis of HIV-I Peptides

40091003E Beijing YOUJI HUAXUE [CHINESE JOURNAL OF ORGANIC CHEMISTRY] in Chinese Vol 12 No 4, Aug 92 pp 418-423, 400

[English abstract of article by Chen Shaoqing [7115 1421 3237], Xu Jiecheng [1776 2638 6134], Shanghai Institute of Organic Chemistry, Academia Sinica, Shanghai; project supported by the National Natural Science Foundation of China]

[Text] The protease-catalyzed syntheses of three peptide derivatives, Boc-Leu-Ile-Cys (Bzl)-N_2H_2Ph(3a), Boc-Gly-Cys (Bzl-Ser(Bzl)-Gly-Lys (Z)-N_2H_2Ph (8a) and Z-Leu-Gly-Leu-Trp-N_2H_2Ph (12a), from amino acid sequence 598-609 of gp41 of Human Immunodeficiency Virus-I (HIV-I), are reported. The C-terminal phenylhydrazide, as well as all the peptide bonds were constructed by papain-mediated synthesis via stepwise elongation. To suppress the side reaction of the secondary hydrolysis, the N^{α}-protected amino acid esters were used as carboxyl components to react with the nucleophiles, amino acid or peptide phenylhydrazides, in an alkaline media. It was also found that CH_3CN was more suitable than CH_3OH for the enzymatic peptide synthesis. For comparison, two of them (3a and 8a) were also synthesized by the conventional DCCI method. The products obtained from both methods were shown to be identical by several criteria.

Cloning, Sequencing of Nuclease BN, SN Gene

40091003A Beijing WEISHENGWUXUE TONGBAO [MICROBIOLOGY] in Chinese Vol 19 No 4, Aug 92 pp 200-203

[English abstract of article by Liu Yule [0491 3768 2867], Ye Yin [0673 1377], et al., Institute of Microbiology, Academia Sinica, Beijing]

[Text] Total DNA of *B. amyloliquefaciens* and *S. aureus* were isolated and cut partially with Hind III, separately. The genes for barnase and for staphylococcal nuclease were obtained by PCR and cloned into pGEM7Z-f(+). The sequencing shows that the nucleotide (nt) sequence of the barnase is 99.3% homologous with the previously determined sequence and the deduced amino acid (aa) sequence found to correspond precisely to the previously determined sequence; the nucleotide (nt) sequence of the staphylococcal nuclease is 99.1% homologous with the previously determined sequence and the deduced amino acid (aa) sequence 99.3% homologous with the previously determined sequence.

These have built basis of making use of special expression or activation of nuclease to produce the male sterility plant by plant gene engineering and to explore new antiviral strategy.

Sensitivity *In Vitro* of *Plasmodium falciparum* to Chloroquine, Pyronaridine, Artesunate, and Piperaquine in South Yunnan

40091003C Shanghai ZHONGGUO JISHENGCHONGXUE YU JISHENG-CHONGBING ZAZHI [CHINESE JOURNAL OF PARASITOLOGY & PARASITIC DISEASES] in Chinese Vol 10 No 3, Aug 92 pp 198-200

[English abstract of article by Yang Henglin [2799 1854 2651], Yang Pinfang [2799 0756 5364], et al., Institute of Malaria Prevention and Treatment of Yunnan Province, Simao; and Liu Dequan [0491 1795 0356], Liu Ruijun [0491 3843 0689], et al., Institute of Parasitic Diseases, Chinese Academy of Preventive Medicine, Shanghai]

[Text] The sensitivity of *P. falciparum* to chloroquine, pyronaridine, artesunate, and piperaquine (CQ, PD, AT, PQ) was assayed using *in vitro* microtechnique in South Yunnan in 1990. The resistance rates were 98.7% (75/76), 27.6% (16/58), 13.8% (9/65), and 97.7% (43/44), respectively, and ID_{50} were 125.0, 19.0, 4.7, and 243.3 nmol/L, respectively. The resistance rate against CQ showed no change as compared to the rates against CQ 5 and 9 years ago; but the ID_{50} was lower. CQ-resistant *P. falciparum* showed a marked cross-resistance to PQ, but not to PD and AT. AT-resistant *P. falciparum* exhibited cross-resistance to the above-mentioned three drugs. PD-resistant *P. falciparum* showed no cross-resistance to AT, but showed cross-resistance to CQ and PQ.

In comparison with chloroquine-coated plates, the plates coated with pyronaridine, artesunate or piperaquine gave similar results as the former, which were shown by the rise in schizont inhibition rates along with the rise in drug concentration. It indicates that pyronaridine-, artesunate-, and piperaquine-coated plates can be used in the assay of sensitivity of *P. falciparum* to the three drugs.

Characterization of Surface Antigen of *Plasmodium falciparum* Merozoite With Monoclonal Antibody

40091003B Shanghai ZHONGGUO JISHENGCHONGXUE YU JISHENG-CHONGBING ZAZHI [CHINESE JOURNAL OF PARASITOLOGY & PARASITIC DISEASES] in Chinese Vol 10 No 3, Aug 92 pp 184-186

[English abstract of article by Jiang Chunlei [5592 2504 7191], Guan Weibin [4619 1919 3453], et al., Department of Parasitology, Second Military Medical University, Shanghai; this project was supported by the National Natural Science Foundation of China]

[Text] The monoclonal antibody (McAb) designated as C6 against erythrocytic stage of *Plasmodium falciparum* Fcc7801/HN showed significant growth inhibition of *P. falciparum in vitro*, having cross immunofluorescence reaction with *P. falciparum* Fcc-1/HN, Fcc7802/HN, Fcc8703/JS and *P. berghei*, *P. cynomolgi*. McAb C6 bound to the antigen distributed evenly over the entire surface of merozoites of *P. falciparum*, as demonstrated by immunoelectron microscopy. The McAb C6 also recognized a single protein of 71 kDa of *P. falciparum* by Western blotting. This antigen might be a candidate of malaria vaccine.

Antidotal Effects of 2,3-dimercaptopropane-i-sulfonate Sodium (DMPS) and Combined With Diazepam on Acute Poisoning Caused by Sodium Ammonium Dimethyl-2-propano-1,3-dithiosulfate Monohydrate (SCD)

40091003F Beijing ZHONGHUA YUFANG YIXUE ZAZHI [CHINESE JOURNAL OF PREVENTIVE MEDICINE] in Chinese Vol 26 No 4, Jul 92 pp 213-215

[English abstract of article by Hu Guoxin [5170 0948 2450] and Chen Zhikang [7115 1807 1660, Department of Pharmacology, Wenzhou Medical College, Zhejiang]

[Text] In mice, DMPS (250 mg/kg, iv) combined with diazepam (1.25 mg/kg, ip) could increase LD_{50} of SCD poisoning 5.3 times. DMPS (62.5 mg/kg, iv) antagonized completely the respiratory depression and neuromuscular blockade caused by SCD (7.5 mg/kg, iv) in rabbits. SCD (15 mg/kg, iv) caused tremor, tonic convulsion and the abnormal paroxysmal discharges in EEG [electroencephalogram] in rabbits. DMPS (0.5 mg/kg, icv) could not eliminate the abnormal paroxysmal discharges in EEG of rabbits. DMPS (62.5 mg/kg, iv) combined with diazepam (5 mg/kg, iv) completely and rapidly antagonize these toxic symptoms and the abnormal changes in EEG.

Effect of Sodium Artesunate on *Plasmodium yoelii* Analyzed by Flow Cytometry

40091003D Shanghai ZHONGGUO JISHENGCHONGXUE YU JISHENG-CHONGBING ZAZHI [CHINESE JOURNAL OF PARASITOLOGY & PARASITIC DISEASES] in Chinese Vol 10 No 3, Aug 92 pp 204-207

[English abstract of article by Han Wensu [7281 2429 4790], Zhou Wenqin [0719 2429 3830], et al., Department of Parasitology, Hebei Medical College, Shijiazhuang; and Zuo Lianfu [1563 6647 1381], Guo Jianwen [6753 1696 2429], Tumor Research Institute of Hebei Province, Shijiaz[illegible]uang]

[Text] The effect of sodium artesunate in *Plasmodium yoelii*-infected mouse erythrocytes was analyzed by flow cytometry. The results showed that malarial DNA content in experimental group was obviously decreased 2-5 hours after the drug was administered, fluorescence distribution of malarial DNA almost disappeared within 24 hours after the administration. It indicates that sodium artesunate can inhibit the DNA synthesis in *P. yoelii*.

Galaxy-II 1 GOPS General-Purpose Parallel Processing Supercomputer

93P60063 Beijing RENMIN RIBAO [PEOPLE'S DAILY OVERSEAS EDITION] in Chinese 20 Nov 92 p 1

[Article by Jia Yong [6328 3057], Cao Guanghui [2580 0342 2547], and Jia Xiping [6328 6007 1627]: "Galaxy 1 Billion Operations per Second Supercomputer Developed"]

[Summary] Changsha, 19 Nov (XINHUA)—A major breakthrough for the nation's large-scale S&T engineering calculations and large-scale data processing has been realized with today's formal certification of the 1 billion operations per second (or 1 GOPS) Galaxy-II supercomputer here in Changsha. Developed by a team of experts in the Computer Institute at the University of Science & Technology for National Defense (USTND), the Galaxy-II is the first domestic general-purpose 1 GOPS parallel processing supercomputer. This second-generation domestic supercomputer, which has 10 times the operating speed of the 100 MIPS Galaxy-I supercomputer first unveiled at the same university in 1983, has a shared main memory tightly coupled with four central processors; master clock speed is 50 MHz, basic word length is 64 bits, main memory capacity is 256 Mbytes, and there are two independent I/O subsystems. Also passing the formal appraisal conducted by a panel of 42 experts assembled from around the nation were development and applications systems, such as the mid-range weather forecasting software system jointly developed by USTND and the State Meteorological Center. This system was run on the Galaxy-II supercomputer as part of the rigorous tests conducted for the certification. The Galaxy-II, which has computer networking functions, will have important applications in other areas, such as petroleum, seismology, nuclear energy, and aerospace.

Gain Test of Nuclear-Pumped ^{3}He-Ne Laser

93FE0038A Shanghai ZHONGGUO JIGUANG [CHINESE JOURNAL OF LASERS] in Chinese Vol 19 No 7, Jul 92 pp 486-489

[Article by Jin Xingxing [6855 5887 2502], Wu Kaishu [2976 2818 2579], Zhong Huaming [6988 5478 6900], and Chen Hande [7115 3211 1795] of the Institute of Nuclear Physics and Chemistry, the China Academy of Engineering Physics, Chengdu 610003: "Gain Test of Nuclear-Pumped ^{3}He-Ne Laser"; MS received 26 Apr 90]

[Text] **Abstract**

The gain (λ = 632.8 nm, transition $3S_2$-$2P_4$) of a ^{3}He-Ne laser system (P_{He}:P_{Ne} = 5:1, P_{total} = 4 x 10^4 Pa) irradiated by thermal neutrons from a steady-state reactor is measured. The gain coefficient is 1.7 x 10^{-2}/cm when the neutron flux is 2 x 10^{12} n/cm^2-s. The effect of neutron flux on gain is investigated, and the influence of temperature on gain is discussed. The experiment shows that this nuclear-pumped ^{3}He-Ne laser system is feasible.

I. Introduction

Obtaining laser output from a steady-state reactor has been an issue of extreme concern in the study of a nuclear-pumped laser. Compared to a pulse-reactor-pumped laser, it is capable of lasing continuously in a stable manner. Although the power output is relatively low, it is very important in the investigation of the principle of a nuclear-pumped laser. The ^{3}He-Ne laser is one of the systems used in the early stage of a study of nuclear-pumped lasers.

In order to demonstrate the feasibility of nuclear-pumped ^{3}He-Ne laser and to understand the lasing condition, it is important to measure the gain of this laser system. A 3 MW pool-type thermal neutron reactor is used in this work. A double-pass optical system is used to measure the gain of the ^{3}He-Ne laser. The feasibility of lasing for nuclear-pumped ^{3}He-Ne laser system was experimentally verified.

As we know, when a thermal electron enters a mixture of ^{3}He-Ne gas, the ^{3}He atom undergoes the following reaction:

$$n + {}^3He \rightarrow P + T + 0.76\ MeV \qquad (1.1)$$

The high-energy charged particles produced, proton (0.57 MeV) and tritium (0.19 MeV), are slowed down in the gas, causing excitation and ionization of the gas atoms to create a plasma. The following resonant energy transfer process takes place when the meta-stable He(2^1S_0) atom and the ground-state Ne atom collide:

$$He(2^1S_0) + Ne \rightarrow He + Ne(3S_2) \qquad (1.2)$$

This process selectively populates the $3S_2$ state of Ne to establish an inversion between $3S_2$ and $2P_4$. When a laser with a wavelength of 632.8 nm passes through this gas mixture, it is amplified according to the following:

$$I = I_0 e^{GL} \qquad (1.3)$$

where I and I_0 are the emergent and incident light, respectively, L is the length of the laser medium and G is the gain coefficient.

References 1 and 2 reported that Carter et al. first achieved nuclear-pumped ^{3}He-Ne lasing with a steady-state reactor at the University of Florida; the neutron flux used is in the 2 x 10^5 - 2 x 10^{14} n/cm^2-s range and the amplifier is made of water-cooled stainless steel tube. It was filled with a ^{3}He-Ne (5:1) gas mixture at a total pressure of 4 x 10^4 Pa. When the neutron flux is 2 x 10^{12} n/cm^2-s, a microwatt-level laser output with a gain coefficient of 2 x 10^{-2}/cm was obtained. However, Prelas et al.[3] questioned this finding. Based on the theory introduced by Wilson and DeYoung,[4] the upper limit of the gain coefficient under ideal conditions is

$$G_{max} = 1.57 \times 10^{-3}/cm \qquad (1.4)$$

In practice, it should be two to three orders of magnitude smaller. Hence, they did not believe that this system could lase at 632.8 nm. Carter et al. thought the model chosen by Prelas was erroneous[5] and both sides insisted that they were right. Since then, very little similar work on a steady-state reactor has been done.

II. Experimental Apparatus

The key technology in laser amplification is amplifier design and gas mixture composition. The gas mixture used has a ^{3}He to Ne pressure ratio of 5:1 and a total pressure of 4 x 10^4 Pa. It has been calculated that the mean free path of proton and tritium in this gas mixture is $R_{P,T} \leq 2$ cm. In order to store most of the energy in the gas, a 3-cm-diameter amplifier tube is employed. The tube length was chosen to be 21.5 cm after taking into account the tangential neutron field distribution of the reactor. When operating at nominal power level, the thermal neutron flux available to the tangential channel is in the range of 2 x 10^8 - 2 x 10^{12} n/cm^2-s. Based on the characteristics of the tangential channel, a double-pass optical path is used for gain measurement. A quartz Brewster window was selected by screening. Its thickness is 2 mm. After it is irradiated by a high neutron flux, its transmittance remains greater than 80 percent.

The experimental optics are shown in Figure 1. The probing laser is an industrial electrical-pumped He-Ne laser (1). It emits a 632.8 nm laser beam. After it goes through the attenuator (3), the light beam is split into two by a partial reflective mirror (7). One beam is received by an R456 photomultiplier tube (4) and the other enters the tangential channel. After going through the amplifier (18), it is reflected along the same path by an aluminum mirror (20) to a partial reflective mirror (8). It is further reflected by mirrors (9) and (12) to reach another R456 photomultiplier (10). A portion of the light is scanned by a Model 44W planar grating monochromator (13). The readings of the two photomultipliers are displayed by Model DT890 digital voltmeters (5) and (11) and recorded by a Model XWT dual-pen plotter. The neutron flux is measured with an ionization chamber (21).

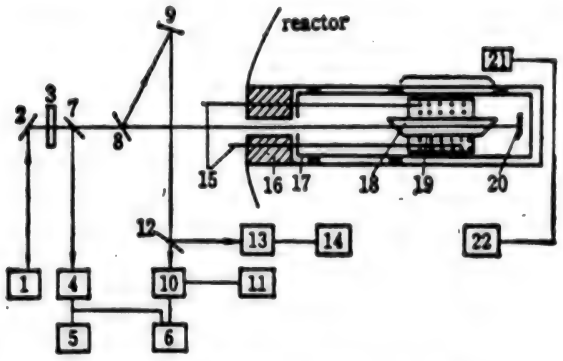

Figure 1. Experimental Arrangement

1. He-Ne laser; 2, 9. high-reflective mirror; 7, 8, 12. partial-reflective mirror; 4, 10. photomultiplier tube; 5, 11. millivoltmeter; 6, 14, 22. plotter; 3. attenuator; 13. monochromator; 15. cool-water pipe; 16. shield; 17. aluminum pipe; 18. amplifier; 19. cooling water; 20. high-reflective Al mirror; 21. ionization chamber

III. Results and Discussion

1. Incident, Emergent Light and Neutron Flux vs. Time

Figure 2 shows the incident light intensity, emergent light intensity and neutron flux as a function of time. As one can see, incident light intensity essentially remains steady as neutron flux varies. The emergent light intensity, however, rises synchronously with increasing neutron flux. There is an apparent gain effect. After neutron flux reaches its peak and remains steady, the gain no longer increases and maintains a stable value. The light intensity is 2.2 times the original value.

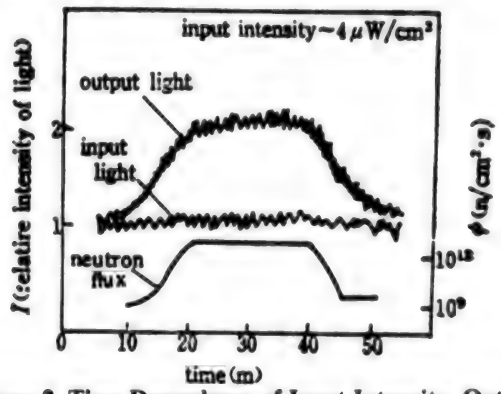

Figure 2. Time Dependence of Input Intensity, Output Intensity and Neutron Flux

2. Gain Coefficient vs. Neutron Flux

Figure 3 shows the gain coefficient as a function of neutron flux (G-φ curve). When the neutron flux reaches its peak (2 x 10^{12} n/cm^2-s), the gain coefficient is 1.7 x 10^{-2}/cm. The incident light intensity is approximately 4 μW. Within experimental error, this result is consistent with that obtained at the University of Florida. Because of limitations by the peak neutron flux, the gain at higher neutron fluxes could not be measured. With increasing incident light intensity (I_0 = 20 μW), the gain coefficient falls substantially (4.0 x 10^{-3}/cm). Due to noise interference in the measurement system, especially due to the effect of turbulence on the light beam caused by temperature non-uniformity in the tube, measurement error becomes large when the incident light intensity is further reduced.

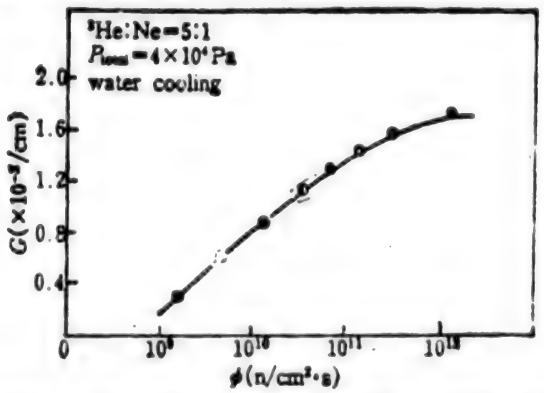

Figure 3. Gain Coefficient as a Function of Neutron Flux

3. Effect of Temperature on Gain

The gain varies substantially as a function of the temperature of the medium. Table 1 shows clearly that the gain coefficient increases significantly when the excitation medium temperature decreases.

Table 1. Influence of Temperature on Gain Coefficient at Neutron Flux of C = 2 x 10^{12} n/cm^2-s

No.	G (cm^{-1})	T	Interpretation
1	1 x 10^{-3}	about 60°C	uncooled
2	4.5 x 10^{-3}	about 50°C	uncooled but good thermodiffusion
3	1.7 x 10^{-3}	about 7°C	water-cooled

Ren Xingbi [0117 5281 4310], Liu Dongyan [0491 0392 3601], Ma Zhenze [7456 2182 3419], Yang Gengchen [2799 1649 6591], Yang Weidong [2799 4850 2639], Hu Zechun [5170 3419 2504], Liu Xiaoya [0491 2556 0068], and Li Xiaoyan [2621 2556 3601] also participated in this work.

The authors wish to thank Wang Guozhong [3769 0948 1813], Jiao Jinglong [3542 2529 7893], and Wang Jianzhong [3769 1696 0022], and the reactor group and mechanical group for their cooperation and assistance.

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Tuning Device for FEL Optical Cavity

93FE0038B Shanghai ZHONGGUO JIGUANG [CHINESE JOURNAL OF LASERS] in Chinese Vol 19 No 7, Jul 92 pp 499-502

[Article by Zhang Bingjun [1728 4426 6874], Wang Mingchang [3769 2494 1603], and Mang Yanping [5462 3601 1627] of Shanghai Institute of Optics and Fine Mechanics, the Chinese Academy of Sciences: "Tuning Device for FEL Optical Cavity"; MS received 11 Nov 91, revised 31 Dec 91]

[Text] **Abstract**

The fundamental principle and method of free electron laser cavity tuning is discussed in this paper. A microcomputer-controlled fine mechanical device is used for fine adjustment. A microcomputer-controlled electro-strictive device is used to achieve superfine adjustment. The fine tuning range is +/- 3 cm and the resolution is better than 0.5 μm. The superfine tuning range is +/- 5 μm and the accuracy is better than 0.1 μm.

[Introduction]

The resonant cavity of a free electron laser (FEL) has two mirrors, i.e., an upstream mirror and a downstream mirror, an undulator and a metal case with several optical windows (see Figure 1).

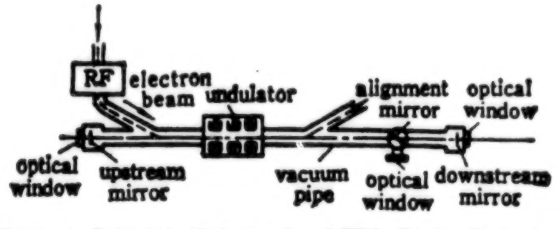

Figure 1. Principle Schematic of FEL Cavity Structure

The magnets in the undulator, used to guide and monitor the transport of electrons, are usually very bulky and the two mirrors are at least several meters apart. There is FEL output only when the resonant frequency of the FEL resonant cavity is rigorously synchronous with the repetition frequency of the electron-beam micropulse. Furthermore, the resonant cavity is particularly sensitive to any displacement, inclination and mechanical disturbance of the mirrors. Hence, to completely coincide the electron-beam trajectory with the optical axis of the basic mode of the undulator and to maintain the cavity at its optimal length becomes a critical issue affecting the normal operation of an FEL. This paper focuses on the tuning of the resonant cavity length.

Cavity length adjustment can be divided into two steps. After installing the resonant cavity according to theoretical computation, its length is fine-tuned with a microcomputer-controlled stepper motor to place it in the normal operating range. It is then automatically superfine-tuned with a microcomputer-controlled electro-strictive device (ESD) to allow the resonant cavity to operate steadily in the optimum state.

I. Operating Principle

The distance d between the two mirrors in the cavity and the radio frequency ν_{RF} of the driving micro electron beam satisfy the following equation:[1]

$$2d = nc/\nu_{RF} \qquad (1)$$

Here, c is the speed of light and n is an integer. Equation (1) is only an approximation because the light pulse slows down after the micro electron beam interacts with the undulator. Therefore, the optical cavity length is smaller than that calculated from equation (1).

Based on the reason given above, there is no FEL output even if the mirrors are accurately installed based on calculated values. There is laser output only when the cavity is within a range of +/- 75 μm of its optimal length. However, the optimal operating state must be obtained when the detuning range satisfies the following equation:

$$\Delta d/d = 10^{-6} \qquad (2)$$

where Δd is the deviation with respect to the optimal length.

Experimentally, radio frequency ν_{RF} = 2856 MHz, cavity length d = 2.519244 m, and Δd is approximately 2.5 μm.

In addition, in long-term operation, the length of the cavity also changes due to thermal effects. Hence, the length of the cavity must be calibrated when the FEL is in operation.

Any deviations due to initial mirror position error and thermal effect will cause the light pulse stored in the cavity to pass over or lag behind the light emitting directly from the electron beam. If it passes over, the cavity is shorter than the optimal length. If it lags behind, it is longer than the optimum value (see Figure 2).[2] The envelope of the light pulse appears to have an extended tail because of cavity loss. This envelope can be measured with a fast-response infrared detector behind the downstream mirror. Its shape is shown in Figure 3.

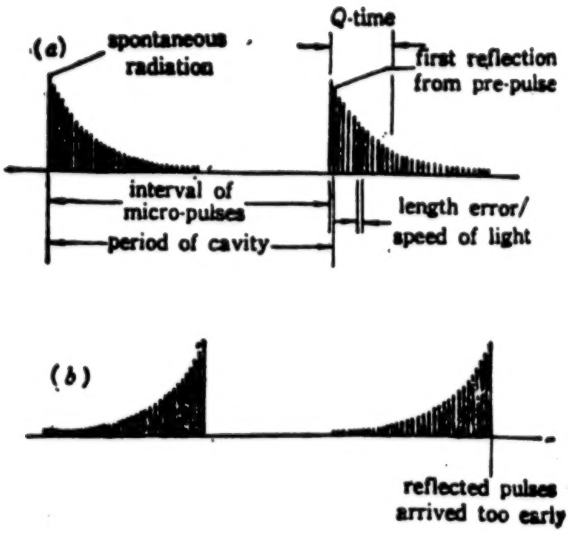

Figure 2. Wave Shape of Optical Pulses From Spontaneous Radiation

(a) Cavity length longer than the optimal value; (b) Cavity length shorter than the optimum value

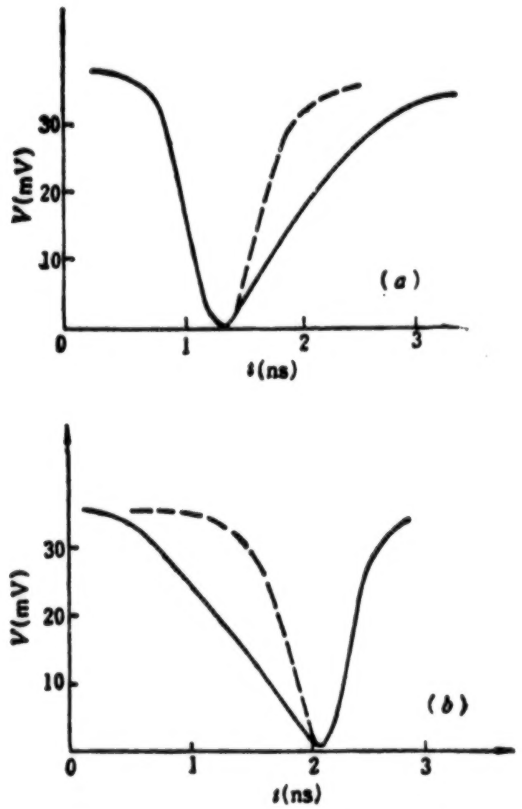

Figure 3. Shape of Optical Pulses Envelope (broken line denotes the optimum value)

(a) Cavity length longer than the optimum value; (b) Cavity length shorter than the optimum value

Through observing the waveform of the light pulse envelope, we can determine the deviation Δd at that instance. Specifically, a data point is chosen in the middle of the leading or trailing edge of the extension portion (where it is more linear) to calculate the inclination α' at that point. A true slope α can be obtained by eliminating the rise time of the detector. α and Δd obey the following equation:

$$\Delta d = c/(2\alpha Q) \qquad (3)$$

where c is the speed of light and Q is the quality factor of the cavity.

After Δd is known, it is possible to determine the direction and magnitude and cavity length adjustment to quantitatively tune the cavity.

II. Design of Cavity Tuning Scheme

As discussed earlier, equation (1) is an approximation. Once the mirrors are installed based on this value, fine tuning of the cavity needs to be done over a relatively wide range. This requires more than one type of adjustment mechanism and needs to be completed in two steps. The first step is to perform open-loop fine tuning of the downstream mirror of cm order with a precision mechanical device. The second step is to switch to closed-loop superfine-tuning of μm order with an ESD to keep the laser in its optimal operating state. Figure 4 shows the principle of the entire adjustment apparatus.

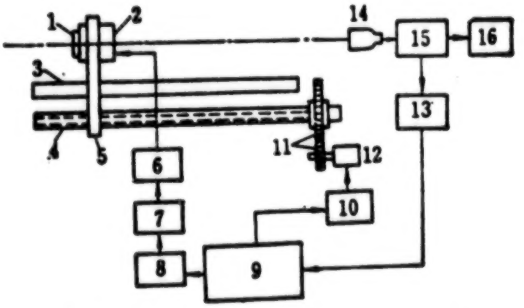

Figure 4. Principle Schematic of the Cavity Adjustment Device

1. downstream mirror; 2. electro-strictive device; 3. slideway; 4. screw; 5. holder; 6. balancer; 7. driver; 8. D/A converter; 9. microcomputer; 10. driver; 11. gear group; 12. step-motor; 13. A/D converter; 14. detector; 15. amplifier; 16. monitor

The downstream mirror is secured on the ESD. As a whole, they are installed on a holder. An ultra-fine screw drives the holder along two smooth rails. The movement of the screw is driven by a stepper motor controlled by a microcomputer. The ESD and the fine mechanical device are installed in series. Therefore, the displacement of the ESD is added on top of the displacement of the fine mechanical device. The displacement of the fine mechanical device is measured by an MT60M grating scale. The ESD displacement is determined with a DGS-6A digital inductance micrometer.

Specifically, the light transmitted through the downstream mirror is received by a fast infrared detector. After amplification, it is simultaneously sent to an A/D converter and an oscilloscope. The output of the A/D converter is connected to the microcomputer. A TP-801B single-board computer is used to control the stepper motor in an open-loop mode. The length of the cavity is delicately scanned in continuous steps. When the waveform shown in Figure 3 is observed, the scan stops. This indicates that the cavity is close to its optimal length. The direction and magnitude of the deviation are determined using the method described earlier. The mirror is moved to the optimal position by taking a number of pre-set steps. Afterward, the TP-801B is switched to a closed-loop mode to control the ESD to allow it to perform superfine tuning over a smaller range. When the FEL output power is maximized by way of superfine tuning, the laser automatically and steadily operates in the optimal state, i.e., maintaining its peak output power.

In this adjustment apparatus, the microcomputer-controlled, stepper-motor-driven mechanical device has a tuning range of +/- 3 cm and an accuracy of +/- 0.5 μm and the microcomputer-controlled ESD has an adjustment range of +/- 5 μm and an accuracy of 0.1 μm.

III. Microcomputer and Its Interface

The single-board computer controls the mechanical device by means of the stepper motor. The stepper motor is highly accurate and has no cumulative error. It is easy to control and is very suitable for real-time tuning.

The computer has the following capabilities in controlling the mechanical device: 1) It proceeds in continuous steps or pre-set steps. 2) The direction of motion of the mechanical device can be conveniently selected. 3) The speed of the mechanical device can be conveniently selected. 4) The step angle of the motor can be easily selected. 5) The operating state of the stepper motor is readily displayed at any time.

The computer performs the following functions to control the ESD: 1) It can control the superfine-tuning magnitude proportional to the strength of the received signal. 2) It can estimate the time constant of the closed-loop system to avoid oscillation.

In addition to controlling the mechanical device and ESD and real-time acquisition of spontaneous and excited light pulses, the computer also controls the entire process. This process can be illustrated by the simplified flowchart shown in Figure 5.

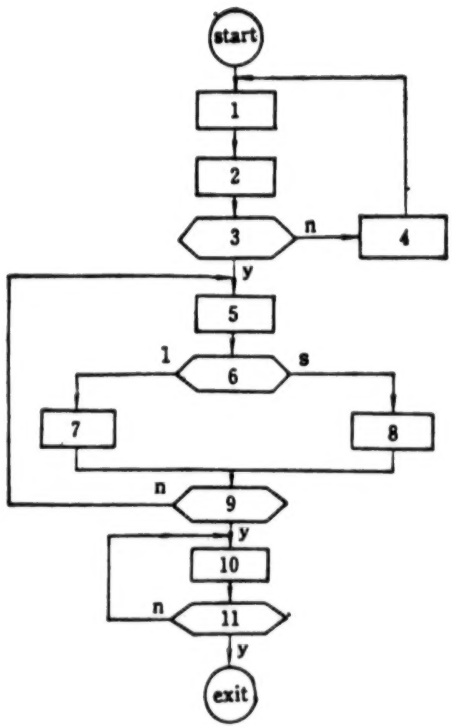

Figure 5. Simple Schematic of Adjustment Procedure

1. adjusting mechanical device; 2. selecting data of the light from spontaneous radiation; 3. light increase or not?; 4. to change adjusted direction; 5. monitoring optical pulses shape; 6. cavity is longer or shorter?; 7. to shorten cavity length; 8. to extend cavity length; 9. stimulated emission occurs or not?; 10. auto-controlling ESD; 11. to exit or not?

Feng Chengshi [7458 6134 1102], Zhou Huifen [0719 1979 5358], and Li Rufeng [2621 1172 7364] also participated in this work.

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